ELECTRICAL REVIEW

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Britain Is Making It

Electrical Manufacturers' All-Out Effort

LAST year was a trying period to manufacturers of electrical and allied products. In the earlier part first thoughts had to be given to urgent war demands, while in the later months all the problems associated with a switch-over to peace-time economy had to be faced. Nevertheless, from information given us by leading manufacturers, it is apparent that the transition is being made more smoothly than at one time it seemed reasonable to expect, having regard to the inadequate supply of labour available, especially in certain grades.

In order to replace war-worn plant as soon as possible and to serve essential civilian needs, which have accumulated as a result of this country's years of all-out war effort, and, in addition, to meet the claims of export, the natural tendency is to concentrate on the rapid production of well-established efficient designs rather than immediately to take full advantage of recent progress that might hold up work in the factories for sometimes disproportionately slight improvements.

High-Voltage Equipment

There were, nevertheless, many instances of notable developments during 1945. In the high-voltage range further opportunities were provided by the grid to prove the reliability of advanced designs of high-voltage plant and mains under working conditions. Examples are the laying of substantial lengths of 132-kV cable and the installation of 2,500-MVA air-blast circuit-breakers for the same voltage. At the same time the demand for improved oil-immersed switchgear and air-break types for lower voltages is well sustained. Grid operation has also for many years enabled three-phase transformers and associated apparatus to be built in the largest units, but an even better sign of electrical activity is an accelerating rate of demand for distribution transformers of up to 500 kVA.

Large Alternators

The most recent effect of interconnected-station running on the design of steam turbo-alternators is the production of two-pole machines up to 60,000 kW, some hydrogen-cooled and some wound for 33 kV, with steam conditions up to 1,350 lb per sq. in. and 950 deg F. Hydro-electric schemes in the Highlands will provide further scope for large water-turbines and alternators, but those going through the shops now in capacities up to 30,000 kW have overseas destinations.

A reminder that D.C. is by no means extinct for certain purposes is the large number of motors under construction for rolling mills and boiler-house auxiliaries, all with Ward-Leonard control, and for locomotives and trolley-buses and, at the other end of the scale, small motors in which unusually fine speed regulation is called for. Numerous orders for a.c. as well as d.c. winders, taken in conjunction with activity in the development and manufacture of mining equipment of all kinds, are indicative of efforts to meet the electrification recommendations of the Reid Report. Electric propulsion of ships seems to be limited for the time being to

vessels of moderate tonnage, but our information is that the potentialities of gas turbines in this connection are being actively investigated.

Experience and Research

ACCOUNTS of the vast field of electrical manufactures that have been given in our columns during the past weeks have necessarily been brief on account of paper restrictions. They provide some evidence, however, of the forethought and careful planning of resources entailed in resuming normal factory production. As soon as the present difficulties arising from shortage of labour have been righted, it seems unquestionable that the increased productive capacity of electrical factories and the experience gained during the war, backed by extended research facilities, will confirm the Ministerial slogan "Britain can make it."

Future of the B.I.F.

AT every pre-war British Industries Fair there was discussion regarding the best period for the Fair—February or May. Advocates of February seemed to rely mainly on the fact that it was well in advance of the "export season"; the others had climatic reasons for their choice. Sufferers from the chill blasts around Castle Bromwich used to think much more highly of May but authoritative opinion inclined to the earlier month, although there was an exception to this rule—Silver Jubilee year, 1937. Now the Ramsden Committee has advocated May as the most suitable month and also one centre at which everything could be seen by the overseas visitor which will have much to recommend it.

Men and Machines

HARD work and more electrification provide the essentials for the recovery by Great Britain of its former position as the leading industrial power, as Mr. E. R. Wilkinson pointed out at the A.S.E.E. annual dinner (reported in this issue). This implies, of course, capable management free to exercise initiative, one of the most important qualifications of which, as Dr. P. Dunsheath said, is the ability to select the right men for their jobs. He drew attention to the discrepancy often found between the thought given to the choice of a machine and to the smaller consideration bestowed on the appointment of staff. Yet the annual charges on the latter may be much higher and last for many more years.

Electricity Supply Law

MORE than a hint of a long-overdue codification of the law relating to electricity supply was given by Sir Donald Fergusson on the same occasion. That drastic amendments are to be expected was clear from his reference to the defects of early statutes and his evident realization of the obstacle to progress created by attempting to base long-term legislation on a stage in technical progress that was soon to pass. The need for a flexible permissive framework that would remove any risk of this kind in a new Act was dealt with by us in our leading article of February 15th.

More Capital

BY an issue of ordinary shares (existing and new) to the present shareholders Associated Electrical Industries, Ltd., proposes to raise £2,600,000 of new money to help finance the great expansion of the group's business, which during the next two or three years is expected to cost about £4,000,000 more than the normal expenditure for renewals and extensions. Some aid will be received from the refund of E.P.T. which has to be devoted to development and re-equipment. Capital expansion is also contemplated by the Brush Electrical Engineering Co. The directors are asking for their borrowing powers to be increased by £1,000,000 (or up to the amount of the issued capital) and after the 1945 accounts are issued they are applying to the Capital Issues Committee for sanction to raise additional share capital.

Engineering Wages

ALTHOUGH their claim for an increase of 20s. a week was not conceded, the engineering trade unions have made substantial gains in the agreement which was reached last week. The weekly rise is 6s. and it is accompanied by a guarantee of a 34-hour week, which continues in modified form the protection given by the Essential Work Order, and payment for six bank holidays is recognized. It is to be hoped that these achievements will result in a period of settled conditions in the industry.

Reinforced-Concrete Poles

Designs to Meet Working Conditions while Preserving Local Amenities

By H. F. Lidster,
Associate I.E.E.

A PROBABLE reaction to the conditions of the war years will be a swing of the pendulum of public opinion in favour of preserving rural attractions. There may be a consequent revulsion against the erection of posts and supports for overhead power lines in country districts unless something really attractive can be constructed.

The ubiquitous creosoted wood pole, useful and effective as it is, often offends æsthetic taste and not a few legal proceedings can be attributed to its shortcomings in this respect. Actually objections to overhead line construction are usually not to the "lines" as such but to their ugly supports.

Baltic fir which was used for poles was plentiful and cheap until the war put a stop to its importation. Even if it ever becomes available again in similar quantity at attractive prices it may not be in the national interest to import it if we have available a home - produced alternative. Unfortunately home-grown timber is poor, bad in shape and variable in quality and condition and has a short life, often not exceeding ten years. The alternative is not therefore timber but reinforced concrete which, in addition to meeting all the needs of a support for overhead lines, can be designed in such a way as to be attractive.

Even in normal times reinforced concrete had advantages over Baltic fir in respect of low maintenance costs. It does not shrink as wood does, and so does not call for line inspections at regular periods to tighten pole bolts. The only criticisms levelled against it were on the ground of high cost as compared with that of Baltic fir and of difficulties in handling and erection on site. With more extensive use, the price difference will no doubt be substantially reduced and experience and reasonable care will considerably lessen risks in handling.

Concrete poles are fabricated in seven classes and in heights varying from 30 to 50 ft, as laid down in B.S.S. 607/1935. They have an iron content of 300 to 500 lb and, in this country, are cast in a horizontal mould, a fresh batch of mixture being made up for each pole. Abroad some experiments have been made in casting the pole in a vertical mould.

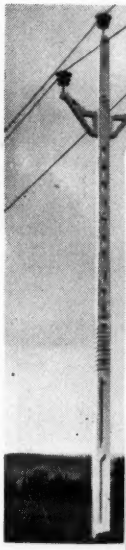


Fig. 1

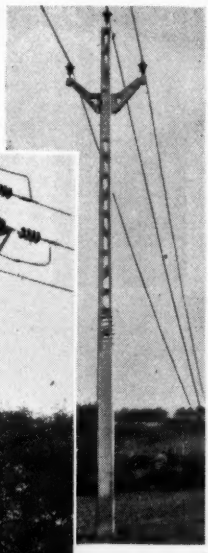


Fig. 2

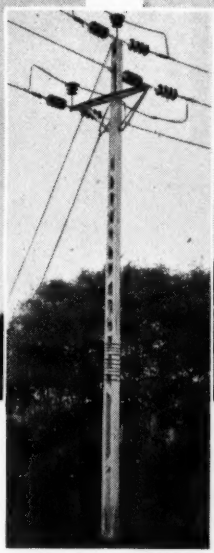
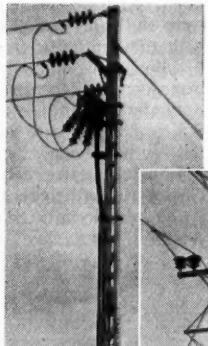


Fig. 3

Examples of 33- and 11-kV transmission-line poles are shown in Figs. 1 and 2 respectively. The heavy single - member angle section pole fitted with six strain sets illustrated in Fig. 3 is much more attractive in appearance as well as more economical than an ordinary H-pole wood structure. Fig. 4 is a single-member 33-kV terminal pole and Fig. 5 shows how two straight-line intermediates can carry both economically and neatly an underslung cradle guard over G.P.O. telephone circuits. This is a typical construction used by the writer for country lanes where the line is not readily visible.

The free-end H-pole in Fig. 6 carries only the cradle guard. This type of structure although simple and inoffensive when not made of creosoted wood should be adopted only where no scenic view or other local amenity can be spoiled; otherwise terminal poles as in Fig. 4 should be used and underground cable should be run in the road with the G.P.O. circuits. These crossings should be in the least conspicuous places. In the long run main line construction costs are not very seriously affected by such underground sections.

A standard H-pole in an angle position carrying six strain sets and an isolating pole switch is illustrated in Fig. 7. Attention is drawn to the absence of the trussing gear usually associated with H-pole structures. Reinforced concrete H-pole structures have a concrete anchor underground to brace the buried portions of the poles. The writer employs a simple straight-bar brace about the centre of the poles to prevent erection distortion, the crossarm being for supporting insulators and not primarily bracing gear. Other engineers consider the bracing bolt in the centre of the structure unnecessary. This simple type H-pole with the clean concrete legs can fit into any surrounding background or scene without causing any offence to the viewer.



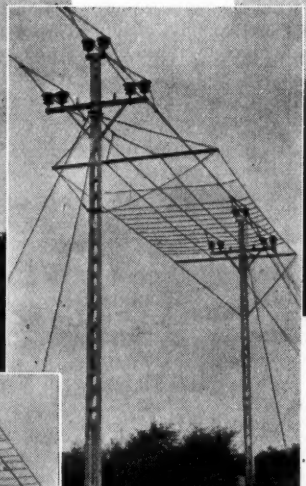


Fig. 4 (right)

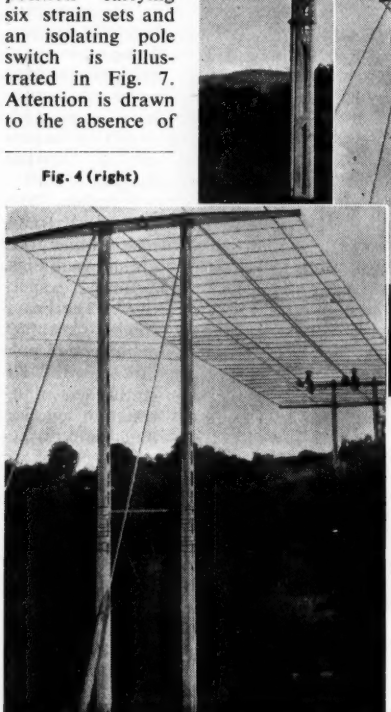


Fig. 5 (above)
Fig. 6 (left)

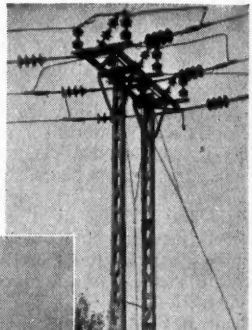
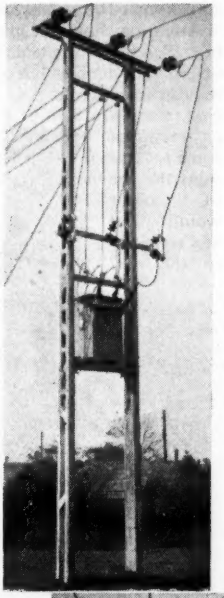


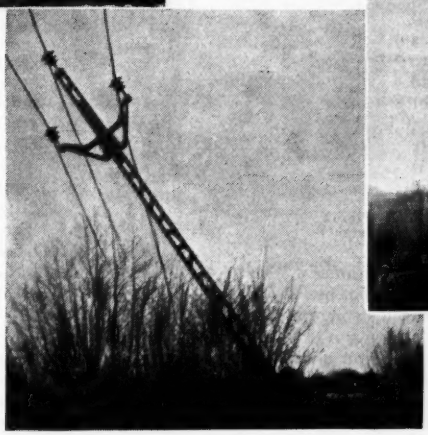
Fig. 7

The H-pole substation in Fig. 8 is a type that can usually be placed in country villages so as to be screened. Little complaint will then arise, for these substations are frequently the most difficult to locate pleasingly. Reducing fittings to a minimum as in this case has some advantage both economically and æsthetically. The simple arrangement of pole-operated 11-kV fuses and the manner of connecting up the medium-voltage side

should be noted. All tubing and insulated medium-voltage connections and tails have been avoided by using a vertical p.b.j. main mounted on ordinary line insulators and D-irons. From this at the required height the main takes off to the first medium - voltage pole in horizontal formation, where it terminates in pole - operated fuses, beyond which a standard vertical formation is followed. The arrangement was adopted as a war measure to cut out the use of t.r.s. connections, but there seems no reason why the practice should not continue as the layout on the site is quite neat.



Maltreatment of poles during transit from manufacturers to site may result in fractures as it would with most cast materials, but once in position they can stand a good deal of abuse laterally. The pole in Fig. 9 was unharmed when canted over to an angle of about 45 deg, thus controverting the common belief that such a departure from the vertical would cause it to snap. Fig. 10 shows a near-miss from a bomb; the pole, although situated inside the edge of the crater, is undamaged.



Concrete poles have withstood many war stresses, particularly the tugging and buffeting of barrage balloons laterally, without serious consequence. When the pull is in "line." however, and the pole is firmly anchored in the ground so that movement at the base is prevented, it will fracture on severe line breakages, but under ordinary conditions "line" distortion is unlikely. The belief that on fracture the pole would snap like a carrot with dire consequences, I have found groundless. Figs. 11 to 14 indicate that the reinforcement will hold the pole together, although all the concrete filling has shattered, leaving only the skeleton iron, which still retains considerable strength so that it is safe to work upon the pole when detaching the lines ready for its replacement. This greater strength is of vital importance in transport and handling and it is therefore essential that this should be fully realized by the erection staff in order that the pole may always be carried on its side to minimize internal stress.

While poles may be delivered either by road or by rail, the final journey is nearly always by motor lorry, at which stage a pole must always be picked up by one sling tied at the centre of gravity, the chafing of the sides being prevented by ample covering of sacking or the like. The pole is best delivered from the nearest highway position to site by hand-truck unless the ground is firm and even, since motor lorries travelling over fields with uneven ground tend to jolt and bounce

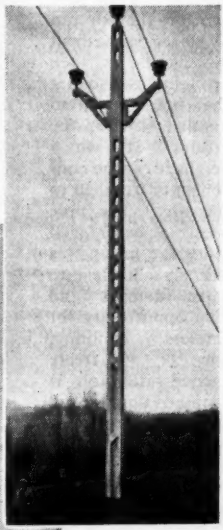


Fig. 8 (left)
Fig. 9 (below)
Fig. 10 (right)

severely, which would cause long concrete poles to be overstrained.

The hand-truck is simply a pair of wheels about 5-ft. in diameter, or a little more, on an axle. The pole to be carried is fitted to the axle by a light sling chain and protected against chafing by wood and sacking. The axle has a long handle for towing, which allows the axle to lower itself by its cranked shape nearly to the ground. The wheels and axle are put over the pole then laid on the ground and the pole is tied to the axle and by lever movement the handle is then brought down so that the pole is lifted about 2 ft. from the ground at which height it can be conveniently trundled to the site. The pole must not be dragged along the ground as this is likely to cause damage and give opportunity for careless handling, whereas if freely carried attention is focused upon it all through the roughest part of its journey. Very long and heavy concrete poles need additional support which is obtained by clamping on the axle a strong baulk on the underside of the pole to give it extra rigidity. This should also be the procedure in other cases where the ground is very rough and broken.

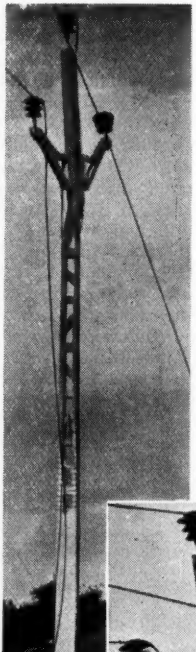


Fig. 11

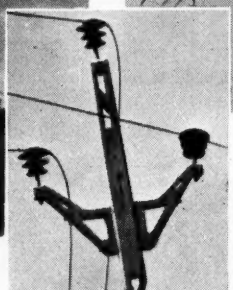


Fig. 12 (right)

The erection of the pole on site should be carried out by a handle-operated winch, fitted to a derrick, as this is safer and more convenient than the motor-operated winch and lorry occasionally used. The hand truck causes little or no damage, whereas a motor lorry or a tractor may leave a trail of broken hedges and torn turf that is visible for months afterwards. Any time saved (which may not be the case) by the use of motor tractors may be off-set by loss of goodwill when it comes to settling compensation for damages.

Attention should be given to the possibility of "blending" the pole with the landscape or its particular background. A white reinforced-concrete pole is attractive in its own simplicity, but in some situations the use of colour would not add seriously to the cost and would earn the gratitude of the residents. I have found the goodwill thus gained results in quicker revenue returns which are more than enough to balance additional cost. In one instance a concrete-pole transmission line ran for some distance parallel with a main highway and between the latter and a view of the Exmoor lowlands and North Devon rising farmlands. The poles were treated with Colourcrete, three parts of holly being blended with one part of black. Although the line is clearly visible for some length, not a single criticism has been received; on the contrary the writer and his company have been thanked for their efforts—an unusual sequel to the erection of an overhead line near a beauty spot. While a dark green finish will generally be found suitable in the neighbourhood of grazing land and woodlands, a brownish red might be considered in arable countrysides, as in Derbyshire and South Devon.

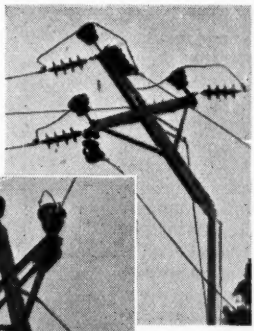


Fig. 13

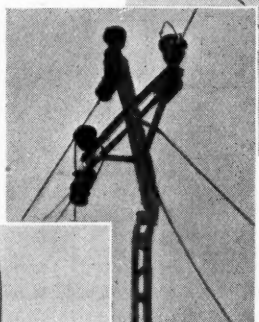


Fig. 14

While the writer has applied Colourcrete mixture to poles, he suggests that it would be more satisfactory to incorporate colour in the concrete. As this might cause delay in manufacture if colouring was not a standard procedure, dipping in bulk might be attempted and this might in the long run be cheapest. The pole could be dipped in a liquid solution to saturation and then allowed to dry. Suitable solutions are copper sulphate, in the proportions of one pound of the sulphate to three gallons of water to give a green tint, and sulphate of iron, in the proportions of one pound of sulphate to two gallons of water to give a rusty brown tint. Applied to saturation point the colours would be permanent; they could also be hand-applied with a brush or sponge.

Before any colour treatment is attempted, a few prominent local people should be called together for a discussion. Such persons are generally glad to give every assistance to a distribution engineer who shows his desire to preserve their local amenities.

Manchester's Street Lighting

Change-over to Electricity Recommended

TOWARDS the end of 1944 the General and Parliamentary Committee of Manchester City Council was instructed to review the street lighting of the city and a special sub-committee was appointed to examine the question. Both the Gas and Electricity Committees submitted memoranda, which, together with the conclusions and recommendations of the General and Parliamentary Committee, are set out in a report presented to the City Council last week.

The investigating committee notes that at present the streets are illuminated by some 20,800 gas lamps and 10,800 electric lamps and says it was agreed that the existing system falls short of the standards laid down by the Departmental Committee on Street Lighting appointed by the Minister of Transport. While the view was expressed that further progress in the efficiency of light production was more likely with electric-discharge lamps than with any other form of illuminant, the Committee is satisfied that the standards laid down can be attained by using either electricity or gas.

A statement of comparative costs shows that a capital expenditure of £146,250 would, it is estimated, be incurred in bringing the existing gas lighting up to the recommended standards, while the cost of substituting electricity for gas lamps would be £662,000. Annual charges would be as follows:—Gas: £139,603 (£8,583 debt charges and £131,020 for operation). Electricity: £109,414 (£38,844 debt charges and £70,570 operation). Thus there would be a saving of £30,189 per annum by substituting electricity for gas. In addition there would be an annual charge of £4,050 in improving earlier electric lighting. For a wholly electric system up to the recommended standards the annual cost is put at £189,364, which compares with £219,553 for a partly gas and partly electric system, and an actual cost of £188,016 for the lighting of lower standard in 1938-39.

The Gas Committee contended that, apart from raising the mounting heights, the existing gas lighting could be made to comply "reasonably" with the recommendations at a capital cost of £5,900, but the report points out that even so substitution by electricity would show a gain of £21,853 per annum.

Dealing with the effects of the loss of street lighting on the Gas Department, the report refers to the anticipation of some compensating expansion in other directions. The question of by-products was raised, but the report suggests that it is unreasonable to expect street lighting by gas to be maintained simply for the manufacture of by-products. On the relative merits of electricity and gas as regards fuel conservation, figures submitted show that coal consumption for gas street lighting in Manchester amounts to about 39,000 tons and the use of electricity for the same illumination would save some 30,000 tons, leaving out of consideration the residual products in the manufacture of gas.

The General and Parliamentary Committee contends that the case for the change-over to electricity is unanswerable. It feels, however, that if the Electricity Committee is given a virtual monopoly and the element of competition thus disappears, some formula should be devised whereby the charge for electricity for street lighting shall be based upon the actual costs of production.

Domestic Load Characteristics

IN a new Technical Report (Ref. K/T116) compiled by P. Schiller and published by the British Electrical and Allied Industries Research Association at 8s. 6d., a collection of after-diversity-demand curves is presented for groups of consumers equipped uniformly with one or more heavy domestic appliances and living on housing estates or in blocks of flats, mostly of the council type. Sufficient details are given in each case to enable the type of consumer, dwelling and locality to be gauged for purposes of comparison and inference. From the collective curves some information regarding cooking demand is derived, supplemented by material on washboilers and water-heaters. No claim is made to comprehensiveness, since much more study will be needed before any general laws can be derived.

Views on the News

Reflections on Current Topics

THAT wartime abomination, the queue, has spread to the electrical industry for the *Hull Daily Mail* has reported that 500 people at Hull recently lined up at the Electricity Department's offices in an endeavour to secure electric cookers. The occasion was a request by the Department that those who had previously asked for cookers under the hiring scheme should renew their applications. Since November last the Department has been able to install over 400 cookers and now they are coming along at the rate of about a hundred a month. Preference is being given to applicants who have no other means of cooking and to existing users of electric cookers who need replacements. At the end of the list are those who wish to change over from gas to electricity—quite a growing number I believe.

* * *

Wisely, I think, the Manchester committee which has been considering the city's street lighting set aside the question of the relative merits of gas and electricity as an illuminant, averring that both could provide the standard required. The financial aspect was decisive, and the committee concluded that the case for changing over to electricity was unanswerable. Including the higher cost of providing a completely new electrical installation, the estimates showed a substantial advantage in favour of electricity. One doubtful claim on behalf of gas was that "Gas lighting is the most pleasing and natural artificial lighting. It closely approximates daylight, and when objects are seen in their natural colours visual and mental alertness are not impaired."

* * *

To have controlled, first as general manager and then as chairman, the destinies of so progressive an organization as the North-Eastern Electric Supply Co. for forty-three years, during which its capital expenditure has increased forty-fold, must be a rare achievement. It was a disappointment to those taking part in the N.E.S.C.O.E. reunion last week, after a war hiatus of seven years, that Mr. R. P. Sloan was not well enough to preside over the first electrical function since his retirement from the company at the end of last month—the more so because the large majority of those present had prepared themselves under his leadership for the varied positions of responsibility in the electrical industry that they now hold, many of them viewing the early days from the other end of "forty years on." Unfortunately Sir Arnold Gridley was also unable to be present for family reasons, but Sir Johnstone Wright was able to officiate at short notice. N.E. Coast engineers, all over the world, will be glad to learn that their old friends and colleagues for the most part appear to wear well. New members welcomed were numerically insufficient to compensate for the toll taken by nature in the past few years and those eligible for a similar welcome should communicate with the hon. secretary, Mr. W. G. Bass, Kern House (Fifth Floor), 36, Kingsway, W.C.2. By the invitation of Lt.-Col. S. E. Monkhouse who, with Col. E. H. E. Woodward, was the guest of honour, next year's meeting is to be held at Newcastle-on-Tyne.

* * *

A short time ago the Walsall Corporation advertised for a successor to Mr. E. A. Newburn, the electrical engineer and manager, who is going to Bath. As the salary offered, £1,400, was £43 below the scale rate the post was "banned" by the A.M.E.E.–E.P.E.A. Joint Committee, with the result that only half-a-dozen applications were received and none of these was considered suitable. The Electricity Committee therefore recommended that the position should be re-advertised at the scale figure. I find it hard to understand why a county borough should risk the loss of the best man just to save £43 a year.

* * *

Referring to the trouble arising from the flexible connections of appliances, in my notes of March 1st, I suggested that it should be possible to devise an arrangement by which flex could be eliminated altogether for this purpose. A correspondent now sends me particulars of a method which he is seeking to patent. This involves the use of a specially-designed switch-socket below which a shelf is fitted at such a height that a kettle, iron or other portable appliance can be plugged into the socket, at the same time switching on the current which is broken upon the withdrawal of the appliance. This operation is accomplished by means of a projection fitted at the base of the appliance which engages with a spring-loaded actuating lever within the socket. The device also incorporates a pilot lamp. Proper earthing arrangements are provided. The shelf is grooved and the three feet of the appliance have to be adapted to conform with the grooves, which is a drawback; but probably this is an unnecessary refinement.

—REFLECTOR.

Degaussing Ships

Methods Described at I.E.E. Meeting

WAYS and means of lessening and modifying the magnetic field gradient in the vicinity of steel ships in order to reduce the risk of exploding magnetically-detonated mines were explained at a two-day meeting last week in London of the Institution of Electrical Engineers.

DR. P. DUNSHEATH (president, I.E.E.) introtroduced REAR ADMIRAL C. S. DANIEL (Third Sea Lord and Controller of the Royal Navy) who gave credit to scientists and engineers recruited at short notice by the Admiralty (400 were "netted in one sweep" with the aid of the I.E.E. Register) and to manufacturing firms which produced cables and equipment in large quantities in short time. An exhaustive analysis of the protective effect of degaussing during the invasion operations off the Normandy coast showed its great value in reducing losses of all types of shipping and therefore its vital assistance to the whole operation.

History and Theory

A symposium of seven papers by ten authors was presented. The first one, by MR. H. W. K. KELLY (Mines Design Department, Admiralty), gave an historical account of pre-war investigations (and described the German magnetic mine) which were initiated for somewhat different purposes during the 1914–18 war. But full-scale cruiser trials (H.M.S. *Curacoa*) in 1937–38 enabled conclusions to be reached which proved to be useful under the full stress of the last war urgency when comparatively little systematic study of the subject was possible.

Throughout the 1939 struggle between the effort to perfect methods of demagnetizing vessels and the sowing of progressively more sensitive sea-mines, degaussing well held its own. No significant rise in casualties from magnetic mines ever occurred in 1939.

Several systems of demagnetization, progressively more complicated, and numerous methods of operation, such as "flashing," "deperming" and "wiping," were introduced and described in detail in this series of papers. DR. D. H. PARNUM (S.D.G. Department, Admiralty) dealt with underwater measurement of the magnetic field, distinguishing between procedure when the ship was moving and stationary. The instruments finally made for each method were described, including basic fluxmeter and magnetometer circuits, the errors of the various systems being also discussed. Most of the instruments were quite new; they had to be very accurate and capable of withstanding really rough usage. The way in which the underwater measuring instruments were placed on the sea-bed was indicated.

The contribution made by the E.R.A. was acknowledged in this paper and spoken of in the subsequent discussion, which was partly in amplification of the papers and partly descriptive of the way measuring ranges had been laid at home and abroad, including references to improvised construction locally at an overseas port.

MR. R. J. GOSSAGE (Admiralty Research Laboratory) explained the use of ship models, and their construction, magnetically to scale in degaussing research. He started with fundamental principles and proceeded to discuss the determination and classification of magnetic field components. Enemy methods of degaussing had been investigated, mainly to estimate resultant fields to be expected below enemy ships.

Installations and Processes

By contrast with the first day's theoretical treatment of the subject, the second day was more practical. MR. W. C. POTTS (S.D.G. Department, Admiralty) surveyed the study of ships' fields in general, distinguishing between vertical, horizontal and athwartship magnetization as well as between different types of degaussing coils and their combinations, also illustrating the positions in which they were installed in ships.

The main difficulty with course-correction was the need to alter coil current or ship's course, to which there was a limit. There was always the risk that course-correction might be wrongly used, especially during rapid manœuvres, thus rendering the ship more rather than less subject to danger. Mistakes due to misapplications were later largely reduced by coupling degaussing devices with the gyro-compass so that coil-currents were automatically corrected within narrow limits for any course.

The appearance of abnormal ship's "signatures" eventually enforced closer study of the "image" (outside the vessel) of magnetic cargo carried inside the ship, which disclosed one of the most interesting features of the subject.

MESSRS. I. S. FRASER, A. A. READ and B. E. VIEYRA (Electrical Engineers Department, Admiralty) dealt with the electrical engineering aspects of degaussing. They traced the evolution of systems from the early temporary expedient of cables clipped to the deck (for which over 53,000 miles of single-core t.r.s. cable was produced at the rate of 1,000 miles a week during the critical 1940 period) through various permanent systems of external copper-strip coils energized from low-voltage motor-

generators to the latest " high-voltage " installations, resistance regulated, utilizing multi-core cable coils incorporating automatic course-correction equipment controlled by the ship's gyro-compass system.

Installations were illustrated with wiring diagrams, methods of jointing outlined and a description was included of the installation in one of the latest battleships. Some 1,685 motor-generators were installed with outputs ranging from 2,400 A for aircraft carriers to 400 A for sloops and destroyers, 5-V generators being specified in some cases. The weight of coil cables in a battleship was 27 tons and that of the motor-generators and control gear about 6 tons. It was to reduce weight that the " high-voltage " system (DC 220 V from the ship's mains) was introduced, with tramway type controllers, later superseded by the induced system. For merchant ships 860 generating sets of 10 kW and 150 sets of 15 kW, driven by steam and Diesel engines, and 625 motor-generators were produced.

DR. S. H. AYLIFFE paid particular attention to means of ensuring the stability of the protective treatment accorded to a ship. As an alternative to the " coiling " of a vessel, " wiping " and " flashing " processes had been used; each was separately described. The " deperming " process was intended to remove, or compensate for, permanent longitudinal and athwartship magnetism, which frequently caused dangerous fields even in the case of " coiled " vessels.

Finally MESSRS. H. C. WASSELL and D. A. TURNER (Admiralty Compass Observatory) explained equipment evolved to correct for the linear effect which degaussing had on the position of ships' magnetic compasses.

Acknowledgements

All the authors expressed their appreciation of the whole-hearted co-operation of the electrical manufacturing industry in producing the necessary equipment. Early in 1943 it became possible for any ship, whatever its flag, to be treated by similar rules anywhere in the world, which agreement greatly simplified the work done in Great Britain, the Dominions (which also contributed technically) and the United States.

Exhibits at the I.E.E. during the meeting included underwater measuring instruments, models of ships and cabling installations, compass correctors and parts of a number of types of German magnetic sea-mines. The last were of relatively simple dip-needle design, but remarkable chiefly for the accuracy of their construction to very fine limits, necessitated by their delicate setting.

The electrical detonation of undersea magnetic mines by means of buoyant cable sweeping was described in our issue of June 8th, 1945.

Swiss Hydro-Electric Scheme

A HYDRO-ELECTRIC scheme, worked out by the Société des Force Motrices d'Urderen for utilizing the Upper Reuss in the Urderen Valley, Switzerland, but held up in 1933-34, is now again under active consideration. Hitherto only the fringe of the potentiality of these waters has been touched by the 60,000-kW 288-metre head station built near Wassen in 1922 for supplying the St. Gotthard railway. The present scheme provides for the construction (in three stages of eight, six and five years) of two main and three regional power stations with an aggregate installed capacity of 1,269,000 kW for a capital expenditure of 1,100 million Swiss francs. With interest at 4·33 per cent, the cost per kWh is estimated to be 2·55 Swiss centimes.

One of the main stations at Pfaffensprung (744,000 kW) will contain in two underground turbine rooms sixteen 46,500-kW vertical-axis 428-r.p.m. turbo-alternators operating under a head of 823 metres. Its output is expected to be 1,700 million kWh from October 1st to April 30th and zero for the remaining months. The generating voltage of 13 kV would be stepped up to 150 kV and the output transmitted underground to Erstfeld for transformation to 380 kV.

In the other 345,000-kW main station at Erstfeld six vertical 57,500-kW Francis 428-r.p.m. turbo-alternators (339 metres head) would be installed in two underground rooms. The output anticipated is 800 million kWh during the seven cold months and 50 million at other times. The output from this station would be transformed from 13 to 380 kV and sent out to the national network.

The 72,000-kW regional station at Goschenen, containing three 24,000-kV horizontal Pelton sets (546 metres head) would generate 180 million kWh during the cold months only. At the Wassen works two 24,000-kW vertical Francis units (277 metres head) would produce 110 million kWh in the winter and 10 million kWh for the rest of the time. From the Amsteg plant 120 million kWh is expected during the cold season and 50 million kWh in the other five months.

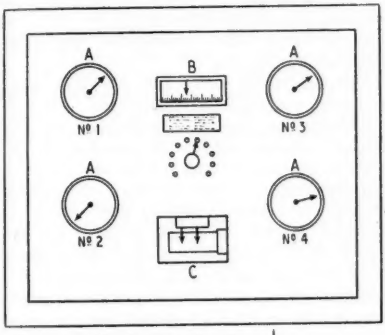
Three pumping stations would be erected for storage. The first, at Hufi, would contain two 9,400-H.P. pumps, one electric and the other driven by the turbine driving the alternator supplying the electric pump. The 42,800 kW of electric pumps at Goschenen would function during the five warmer months only. The third pumping station, also electric, at Sedrun, would have a capacity of 31,000 kW. Together the three plants would consume 40 million kWh to return to the reservoirs 37 million cu metres during the seven cold months and 200 million kWh for 185 million cu metres during the rest of the year.

Cooling Tower Equipment

Measurements to Check Performance

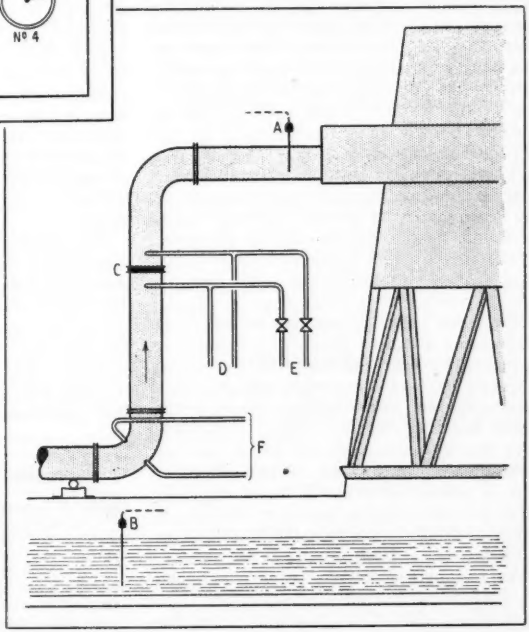
By C. H. Fielding,
B.Sc., A.M.I.Mech.E.

INSTRUMENT panels such as those which centralize performance data of boilers and turbines are an indispensable aid to efficient operation; yet no corresponding equipment is fitted to cooling towers, which handle half the heat generated in the boilers.



Above: Simple panel for essential measurements
A, flow indicators. B, multi-point distance thermometer. C, wet- and dry-bulb temperature recorder

Right: Orifice and bend with metering connections
A, inlet thermometer. B, outlet thermometer. C, orifice plate. D, orifice pipes to manometer. E, flushing vents and connections for portable manometer. F, alternative bend connection to panel



Few operators know definitely whether or not their cooling towers are working up to their guarantees. In the first place the operator has no guide as to how much water is going over any one tower, even though he may be able to compute the total circulating water leaving the condensers.

With turbines on the regenerative feed-heating cycle, the problem of ascertaining the amount of steam entering the condenser at any load is more complex and the determination of the circulating water quantity more laborious, though some help is given by turbine makers who usually give the amount at one or two specified loadings.

In considering cooling tower operation perhaps the most important item is the weight of water cooled in a given time, usually in gal. per hr. Many makers base their guaranteed re-cooled water temperatures on the full-load water quantity only, but in practice towers work over a wide range of water quantities, depending on the number of pumps on load at a given time. This means that it is not often possible to check a tower performance from the guarantee, because the water weight passing through it may be different in practice.

A useful but simple instrument panel might comprise a flowmeter for each tower, indicating distance thermometers for the water entering and leaving the towers, and a recording meter giving a constant record of the atmospheric wet- and dry-bulb temperatures. The flowmeter might comprise an orifice plate at some vertical part of the pipe

work to the tower-inlet connection. Even if a permanent flowmeter were considered unjustifiable, an orifice plate could be installed for use with a portable manometer for check purposes.

As an alternative to an orifice plate, which may be difficult to accommodate in the existing pipework, a pipe bend could be used as a metering device. When a fluid passes round a pipe bend the pressure is greater at the outer radius than at the inner radius owing to the change of direction, and the differential pressure set up can be used to measure the rate of flow.* All that need be done is to drill holes diametrically opposite at the inner and outer radii of the bend for the insertion of the manometer connections.

Calibration Methods

The calibration of such a device will be simple, provided that the tower can be run in conjunction with one turbine, so that all the circulating water from the set passes over it. The circulating water quantity will be calculated from the amount of steam entering the condenser and the temperature rise of the water. Water used in the air and oil coolers must be included in the calculations.

Where circulating-water pumps are in duplicate, two points on the calibration curve are immediately available, and by valve throttling further points can be obtained. In this way a direct reading of water quantities is given without assuming any constants for the coefficient of discharge.

The water quantity can also be measured at the pond outlet by means of a flume or a rectangular notch. As, however, the weight of water leaving the tower pond is not necessarily the same as that entering the tower, because a certain amount will have been lost through evaporation and because make-up water is usually fed into the pond also, it would seem better to measure the water quantity entering the tower. Moreover, flumes at pond outlets have the disadvantage of covering a large amount of ground, whilst rectangular notches cannot, as a rule, be arranged with a reasonable drop on the downstream side of the notch to avoid the weir being flooded. Remote temperature indication of the water entering and leaving each tower is necessary. Assuming a common inlet temperature to the condensers of a number of turbines working together, the outlet temperatures will vary with the loading of each set making it possible for the temperatures of water entering several towers to differ according to the disposition of the pipework.

The temperature of the water leaving the towers may also vary, and a thermometer at the pond outlet (preferably where there is considerable turbulence) is desirable. The lowest point to which water can be cooled theoretically is the wet-bulb temperature. The more nearly the tower re-cooled temperature approaches the wet-bulb temperature, therefore, the more effective the tower is as a cooling agent.

Records of the wet- and dry-bulb thermometers are a prime requirement. Usually the guarantee figures are based on the average annual values of these and are given as 55 deg F and 75 per cent relative humidity; that is, the dry bulb average is 55 deg and the wet-bulb 52 deg F. It is doubtful whether a single average of this kind is applicable to any part of the country or whether the same value will apply to any particular year. Continuous record of such data is kept at very few power stations, and the mean conditions in most localities are therefore unknown. A recording instrument, giving a continuous record of the wet- and dry-bulb thermometers, would be most useful.

The amount of make-up water required approaches that of the turbine steam consumption and generally varies between 8 and 10 lb per kWh generated so that for a daily output of one million kWh it will be at least 800,000 gal. To keep an accurate check on this item and the metering of the total make-up from whatever source should be a regular part of the routine records.

* "The Use of Pipe Bends as Flowmeters," H. A. Addison, *Engineering*, March 4th, 1938.

Automatic Telephony at Aberdeen

PLANS for the change-over to automatic working of the telephone system in the autumn of 1948 were described recently by Mr. W. D. Kay, traffic superintendent, P.O. Telephones Department, Aberdeen. Designs had been reviewed to cater for double the 1939 trunk load and many new subscribers. At the same time opportunity was to be taken to incorporate new facilities which had been developed. Subsidiary automatic exchanges will be in the west and northern sectors of the city and at Cults. All automatic numbers will consist of five digits, the first two directing the call to one or other of the four exchanges. Exchanges within a reasonable radius of Aberdeen will be given code numbers.

Equipment in Temporary Houses

E.D.A.'s Guidance for Electricity Authorities

MEANS of ensuring the efficient maintenance of electrical equipment in temporary houses have been studied by a special sub-committee of the Electric Cooking Committee of the British Electrical Development Association. The matter is complicated by the division of responsibility between the Ministry of Works, the manufacturers of the equipment, the housing authorities and the electricity supply undertakings. It has been officially recommended that the supply undertakings should be given the responsibility for maintenance by local housing authorities and in any case this is considered desirable for the sake of the reputation of domestic electrification.

In a recent circular the Ministry of Health suggests the following procedure. Immediately before the houses are handed over by the Ministry of Works the local council should ensure that the apparatus is in working order and that defects are made good or noted for the future attention of the M.O.W. The council should then arrange with the local electricity undertaking to carry out maintenance. Manufacturers' guarantees will be transferred to the electricity undertaking and it will deal directly with the manufacturers for the supply of components for maintenance. In view of the supply position stocks of components should be restricted to the minimum. A booklet for the use of tenants has been prepared by E.D.A. A supply of these will be distributed through the local electricity authorities. The Association has arranged for supplies of spare parts to be available to undertakings "at rates commensurate with similar parts for standard trade pattern appliances."

Parts for "V" Cookers

Manufacture of the "V" cooker has been shared by a number of makers (Belling, B.N.E., Carron, Elexcel, Falco, Falk Stadelmann, G.E.C., Jackson, Revo & Simplex) and the production of interchangeable parts, in accordance with the E.D.A. specification, has been arranged between them. In a memorandum sent by E.D.A. to its members price lists of these parts are included. Each cooker bears a code reference indicating the assembling manufacturers' name and components are also marked. Application for free replacement under guarantee should normally be made to the assembler of the cooker but application for free replacement of grill boilers and oven elements should be sent to the maker of the part in question. Orders for replacements falling outside the guarantee should be sent to Falco, G.E.C., Jackson, Revo or Simplex. Spare parts for the English Electric, Tricity and B.N.E. cookers supplied to temporary houses before the "V" cooker became available should be ordered from their respective makers.

In order to assist in overcoming the restriction on output caused by the limited production capacity for light iron castings, the Government arranged for the English Electric Co. to make an aluminium cooker. This will be used only in aluminium temporary houses.

Washboilers of the normal portable type are made by Burco, South Wales Switchgear, Simplex, Universal Boilers and the Sloan Electrical Co. Prices of spare parts likely to be required are appended to the memorandum.

Water-Heating Equipment

The special 2-kW immersion heater fitted in the hot-water cylinder is made by Hotpoint, George Bray, G.E.C., Santon, South Wales Switchgear, B.N.E., and Ferranti, and the thermostat is by the Rheostatic Co., except for the few d.c. models which are by MacLaren.

The control panel has been specially made by a number of manufacturers to a M.O.W. specification. The name of the assembling manufacturers is given on the cover and the makers of switches and fuses can be identified by the markings upon them or upon application to the assemblers.

Compressor type refrigerators (3 cu ft capacity) have been specially designed by the Pressed Steel Co. and the B.T.H. Co. Both makes will have sealed compressor units which must be completely replaced in the event of failure and returned to the manufacturers, who will have special reconditioning departments. These are for A.C. only; for D.C. a 1½ cu ft Electrolux absorption type refrigerator will be fitted.

Forthcoming Events

Monday, April 15th.—*Birmingham.*—Grand Hotel, 6 p.m. Birmingham Electric Club. "Photography Applied to the Electrical World," by D. MacMaster.

London.—John Adam Street, Adelphi. W.C.2. 1.45 p.m. Royal Society of Arts. "The Evolution of Stage Lighting," by L. G. Applebee.

Tuesday, April 16th.—*Manchester.*—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre (Installations Group). "Mineral Insulated Metal Sheathed Conductors," by F. W. Tomlinson and H. M. Wright.

Stockport.—Mersey Hotel, 7.30 p.m. Association of Supervising Electrical Engineers (Manchester Branch). "Standardization of Electrical Equipment," by S. Lees.

Luton.—Town Hall, 7.30 p.m. Luton Electrical Society. Annual general meeting, followed by film display.

Leeds.—The University, Great Hall, 7 p.m. I.E.E. North-Midland Centre. Faraday Lecture, by Dr. T. E. Allibone.

The Budget

Proposed Profits Tax

THE Chancellor of the Exchequer (Mr. Dalton), introducing his Budget in the House of Commons on Tuesday, announced that the excess profits tax would be repealed altogether as from December 31st next and would be replaced by a " profits tax " the form of which was under consideration. For the rest of this year E.P.T. would continue at 60 per cent.

With regard to purchase tax, he said that he did not regard this as a temporary tax. It must stay and yield an increasing revenue over the next few years to help to pay for social betterment. He proposed to remit or reduce the tax on a carefully selected range of articles. Articles on which it would be remitted altogether included electric kettles, fuel saving devices, kitchen fitments, office machinery, mains-operated handlamps, public clocks and epidiascopes. A reduction from 100 to 33⅓ per cent would be made in the case of musical instruments, gramophones and records, photographic requisities, and hair-waving and hair-drying machines.

The Chancellor also announced that workers' contributions under the National Insurance Bill would be exempt from income tax. Other concessions included an increase in the earned income allowance later in the year and in the special allowance for married women in industry.

Single-phase Distribution

Supplying Sparsely Populated Areas

THERE are many advantages in single-phase distribution for supplying electricity to small villages, hamlets, farms and other isolated premises in sparsely populated parts of rural areas. Single-phase overhead lines are simpler and of neater appearance than three-phase systems, the maintenance cost is lower, the capital cost is 20 per cent less, iron and copper losses are 10 per cent lower, the total weight is from 15 to 20 per cent less, the voltage regulation is better and fewer insulator bushings are needed.

Such are the conclusions reached by MESSRS. J. S. PICKLES and W. H. WILLS (Dumfries County Council) in a paper submitted to the Transmission Section of the Institution of Electrical Engineers. The authors base their statements on practical experience gained in a typical area; the construction of the distribution system is described and consumer requirements are examined in some detail.

The capital cost of establishing the single-phase area described was £189,300; an equivalent three-phase system would have cost £60,000 more, but that extra capital would not have brought in a penny of additional revenue. The greater cost of single-phase motors borne by sundry consumers did not exceed £6,000, which is small by comparison with the whole.

The authors' experience proves that a three-phase system of high-voltage distribution as a " backbone " is essential and that three-phase low-voltage mains are needed in towns and large villages as well as for industrial consumers. Otherwise the single-phase system advocated in the paper is entirely adequate and satisfactory, as well as technically advantageous for all domestic purposes. Its only disadvantages, very minor ones, are the greater cost of a few motors and their poorer starting characteristics; but the demand for motors in rural areas is very limited and all normal needs can be satisfied.

Municipal Reports

Southend-on-Sea

DURING the war the Southend-on-Sea Electricity Department lost 7,000 consumers but most of these have now returned and Mr. A. C. Johnson, the borough electrical engineer, in the last annual report before his retirement, expresses the view that the undertaking has now recovered its pre-war vitality. In 1938 Southend held the record for the whole country in the proportion of water-heaters in use to the total number of domestic consumers. The figure was then one in 2·4 consumers, but today there is one water-heater to every 1·8 domestic consumers, besides which there is a waiting list of several hundred consumers.

During 1944-45 electricity sales rose by 23 per cent to a total of 56,046 million kWh, but this was still well below the 1938-39 record of 70,652 million kWh. Revenue amounted to £354,140 and there was a deficit of £20,592 on the year, but at the present rate of increase in the number of consumers the result for 1945-46 should be much improved. New tariffs, including a domestic block tariff, came into operation last year and will become compulsory for existing consumers in 1947.

On the technical side, Mr. Johnson mentions that the Department has evolved a substation indicator which shows at London Road the location of any faults on the e.h.v. network. Also a member of the staff has designed a sensitive high-voltage protection device (now patented) which has proved very successful in localizing losses of supply to the particular areas affected, and a scheme is being prepared for applying the device throughout the high-voltage network of the borough.

Cheltenham

The 1944-45 report of Mr. R. W. Steel, engineer and manager of the Cheltenham Electricity Department, shows that power and contract rate supplies decreased by 7·8 per cent to 14·6 million kWh, while combined lighting, heating and cooking supplies, at 10·5 million kWh, were up by 24·9 per cent. Total sales were 37·4 million kWh against 36·2 million in 1943-44. Income amounted to £225,027 (£219,461) and there was a net profit on the year of £4,428.

PARLIAMENTARY NEWS

By Our Special Reporter

Mobile Power Stations for Spain

LAST week in the House of Commons Captain Swingler asked the Minister of Supply what countries had placed orders for mobile power stations in Britain since July 1st, 1945, and for how many, and whether he would make a statement on the sale of thirteen mobile power stations to the Spanish Government.

Mr. Wilmot said that ten surplus mobile power stations had been sold to Spain and negotiations were proceeding for the sale of another three. These plants were needed for the development of Spanish industry and agriculture. No other outlet had been found for them.

Radio Valves

Mr. A. Lewis asked the Minister of Supply what action he proposed to take to overcome the cartel activities in the radio valve industry.

Mr. Wilmot said that the Central Price Regulation Committee had been asked to inquire into the prices of radio valves. Its report was awaited.

Wireless Licences

Mr. Ernest Davies asked the Assistant Postmaster-General what was the net contribution made by revenue from wireless receiving licences to the Exchequer as surplus, after deducting the share of the revenue assigned for collection and similar services, from January 1st, 1937, to March 31st, 1939, and from April 1st, 1939, to the date when a grant in aid was substituted for the previous financial arrangement.

Mr. Burke said that the amounts were as follows:—January 1st, 1937, to March 31st, 1939: £1,242,500. April 1st, 1939, to March 31st, 1940: £289,000.

Kingston Power Station

On April 2nd Mr. Keeling asked the Minister of Town and Country Planning whether he was aware of the fears felt for the effect on Thames amenities of the power station now under construction on the river bank at Kingston; and whether he would arrange for a public inquiry to be held into the possibility of mitigating damage to such amenities by improving the elevation, altering the method of delivering fuel, and adopting the most efficient method of preventing the discharge of smoke, grit and sulphur into the air.

Mr. Silkin said he knew that there was anxiety. The power station was now being erected in pursuance of an approval given by the Electricity Commission in 1941, and he had no power to hold a local inquiry into the project as a whole, though he could hold an inquiry into certain extensions which were contemplated. He did not, however, consider that there would be any advantage in that since the need to protect amenity was appreciated by all the authorities concerned. Conditions were, in fact, imposed by the Commission to secure that so far as reasonably practicable there should be no injury to amenity and he was arranging for officers of his Department to confer with those of the Ministry of Fuel and Power and the Electricity Commission in regard to practicable steps to be taken with this object. He would consider submitting the elevations to the Royal Fine Arts Commission, in so far as he had the power.

Road Safety

Mr. Janner asked the Lord President of the Council to what extent the Road Research Organization was concerning itself with the application of electronic devices to assist road safety.

Mr. Herbert Morrison said that the Road Research Organization of the Department of Scientific and Industrial Research was using electronic devices in investigating strain in, or pressures on, road surfaces as part of the study of road design and construction. Where appropriate, electronic devices would also be used in examining traffic flow and in other researches concerned with road safety, which it had recently been decided to include in the revised terms of reference.

Telephone Development

The Post Office and Telegraph (Money) Bill published last week authorizes the Treasury to issue a further £50,000,000 to cover Post Office developments up to 1948. Most of this sum is required for the extension of the telephone service.

Supply Voltages

Asked by Mr. Orr-Ewing what proportion of the total units of electricity sold in this country was sold to areas where the voltage was not between 210 and 250 A.C., Mr. Shinwell said that in 1943 2·2 per cent of electricity was supplied by undertakings operating entirely on voltages below 210; none was supplied at voltages over 250. Fifty-nine undertakings gave part of their supplies at voltages below 210 but their statistics did not show how much was supplied at those voltages.

Concrete Poles

With regard to the use of reinforced concrete poles, Mr. Shinwell said that they were suitable technically for 11-kV overhead lines but as they cost more than timber poles and were more expensive to install their use would seriously increase the cost of providing electricity in rural areas. He would not, therefore, feel

justified in encouraging their use by electricity supply authorities unless the cost could be considerably reduced.

Mr. Belcher, Parliamentary Secretary to the Board of Trade, said that as many overhead-line poles would be imported as could be obtained without prejudice to urgent requirements of pit-props, but he was afraid the position was likely to remain tight.

Scottish Hydro-Electric Board

Major Guy Lloyd asked the Secretary of State for Scotland what allowance the former chairman of the North of Scotland Hydro-Electric Board received for expenses; and whether the present chairman was entitled to the like allowance. Mr. Westwood said that travel and subsistence allowances were payable to the former chairman of the North of Scotland Hydro-Electric Board and were payable to his successor, at the rates normally paid to members of Royal Commissions and bodies of similar status. In addition, the Minister of Fuel and Power and he, with the approval of the Treasury, had agreed to the payment to the new chairman, who was not accepting any salary, of a hospitality allowance at the rate of £200 per annum.

Coal and Fuel Oil

Mr. Shinwell stated that in 1944 5,287 tons of fuel oil were used in steam power stations of authorized electricity undertakers, as compared with 23,118,807 tons of coal. It was estimated that, of the 37,000 million kWh generated, only 17 million kWh was produced by oil-fired plants.

Electrical Supervisors

Speeches at Annual Dinner

ALTHOUGH reunions of the Association of Supervising Electrical Engineers have taken place each year throughout the war, the function on April 5th was the first since 1939 to be held in the evening. In proposing the health of the guests included in the company of 450, MR. E. R. WILKINSON (president) urged that post-war reconstruction would necessitate an increase in the output per worker of 40 per cent, which must come mainly through hard work and electrification. The latter implied that the horse-power of motors installed must quickly be doubled (i.e., increased by 12 million H.P.). Improved efficiency in winning coal and full-time mining were essential to provide adequate supplies at the power stations at very much lower prices; these had risen by more than 200 per cent for the electricity supply industry within the past ten years.

Clearing Up Outmoded Legislation

Responding, SIR DONALD FERGUSSON (Ministry of Fuel and Power) referred to the inability of social institutions to keep pace with scientific developments and touched upon the obstacles to progress in electricity supply which arose out of legislation that had been based on technical conditions intended only for giving local supplies; a new structure was being devised in accord with modern requirements. Even in the event of atomic energy ultimately taking the place of coal, there would still be opportunities for electrical engineers, as limits to the services that could be rendered by electricity were not yet in sight.

The toast of the Institution of Electrical Engineers was proposed by SIR HUGH BEAVER, formerly with the Ministry of Works and now returned to commercial life, who considered that planning should be related first to industrial efficiency. Only if industry were prosperous could other amenities be provided and in this electricity (a barometer of progress) would play a principal part. Response was made by DR. P. DUNSHEATH (President I.E.E.) who emphasized the continued value of enterprise through individual effort under good leadership. While committees and also some Government control were necessary, they provided no substitute and he regarded "public enterprise" as a contradiction in terms.

Huge demands for electrical products were being received and order books could be filled for the next ten years without difficulty. His recent visit to Canada had confirmed his faith in the value of the Commonwealth in overseas trade. While scientific research was essential to enable us to hold a premier position internationally, the choice of the best men on the production side was equally so.

MR. H. J. RANDALL (chairman, E.D.A.) proposed "The Association," one of the finest features of which was the importance it attached to the training of younger men and duty to the community.

Compulsory Registration

In his reply MR. J. W. NOBLE (chairman, A.S.E.E.) referred to the presence of many members now returned from the Forces and touched upon the good relations between the Association and other bodies. He believed that compulsory wiring rules and registration of electricians would be necessary in the interests of the public, which could not otherwise discriminate between qualified and unqualified practitioners. The A.S.E.E. examination and the award of the Swann Diploma (in connection with which special thanks were due to Professor Kapp) would do much to raise the standard of efficiency and would be helpful to employers in assessing the value of electrical supervisors.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE chief transmission engineers of the various areas of the Central Electricity Board recently attended a meeting in the South-West England and South Wales Area. We reproduce a photograph taken on the occasion.

Left to right:—Front row: Messrs. S. Hoggart (S.W. Eng. & S. Wales), J. A. Aked (Central & S. Scotland), J. D. Peattie (deputy chief engineer, C.E.B.), J. T. H. Legge (manager, S.W. Eng. & S. Wales), J. A. Lee (construction engineer) and C. F. Bolton (S.E & E. England). Back row: Messrs. E. Buckley and W. J. Nicholls (head office engineering staff), H. S. Davidson (Cent. England), H. R. Schofield (N.W. England), A. Gray (N.E. England), R. H. Grafton (Mid E. England) and T. S. Andrew (tech. engineer, S.W. England)

Mr. B. P. Cheltenham, A.M.I.Mech.E., M.I.E.I., has been appointed to the staff of the British Export Trade Research Organization as contact officer for the electrical and allied industries. Mr. Cheltenham was educated at Manchester University and served an apprenticeship with the Metropolitan-Vickers Electrical Co. Subsequently he joined Vickers, Ltd., and during the war he acted as senior inspecting officer for the Chief Inspector of Armaments and afterwards became controller of the Armament and Machine Tool Division (Economic Branch-Control Division) in Germany.

Everett, Edgcumbe & Co., Ltd., have appointed **Mr. E. R. A. Milne,** A.M.I.E.E., as their technical representative in North West England with headquarters in Manchester. **Mr. W. Bamford,** B.Sc., A.M.I.E.E., has become chief sales engineer at the company's Hendon headquarters.

Mr. W. Bamford

On March 29th the employees of the Barnsley Electricity Department entertained to supper their chief, **Major E. A. Barker,** M.C., M.I.E.E., at the Town Hall, Barnsley, on his retirement after 46 years' service. Alderman Leach, chairman of the Electricity Committee presided and paid a tribute to Major Barker's work at Barnsley. On behalf of the employees, Mr. J. A. Burton, boiler-house and turbine-house superintendent, who also has 46 years' service with the Department, presented Major Barker with a barograph and desk lamp. Alderman Leach then introduced Mr. G. H. Sammons, the new electrical engineer, and the proceedings finished with an entertainment, in which employees took a prominent part.

On his retirement after forty years' service, **Mr. A. J. Hutchinson,** borough electrical engineer of Farnworth, who is an enthusiast in game sea fishing, was presented on behalf of the staff with a reel and line on March 30th. The presentation was made by Mr. W. Green (driver) and good wishes were also expressed to Mr. and Mrs. Hutchinson by Mr. A. Nuttall (mains engineer), Mr. H. Greenwood (meter engineer) and Mr. H. Clowes (on behalf of retired members of the staff).

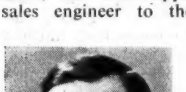
Mr. F. R. Haigh, who as we reported last week is to succeed Mr. A. J. Hutchinson as borough electrical engineer of Farnworth, was born in Leeds in 1912 and was educated at the local Modern School and at the Leeds College of Technology; he took the B.Sc. (Hons.) degree in electrical engineering of Leeds University. He gained practical experience with Flather & Co., Ltd., and Ernest Jones & Co., Ltd., Leeds, and in 1937 became assistant mains engineer with the Yorkshire Electric Power Co., rising to assistant district engineer in the South Yorks area. At the end of 1943 he was appointed senior lecturer in electrical engineering at the Wigan and District Mining and Technical College. Mr. Haigh is an associate member of the I.E.E.

Mr. F. R. Haigh

W. T. Henley's report the return from the Forces of a number of their outside representatives, including the following:—Mr. C. S. L. Brightman (Newcastle branch), Mr. F. E. Saunders (Glasgow), Mr. O. S. Upton (Brighton), Mr. J. S. Macintyre (Edinburgh), Mr. R. S.

Owen (Liverpool), Mr. B. S. Cooper (Southampton), Mr. H. W. Norman (London), Mr. F. C. Linter (London), Mr. F. J. Thornton (N.W. England) and Mr. J. R. Baxter (London; returned from the M.A.P.). Mr. C. E. Davidson has been appointed a representative at the Leeds branch.

Mr. G. L. Tomlinson, consumers' engineer to the St. Helens Corporation Electricity Department, has been appointed development and sales engineer to the Sheffield Corporation Electricity Department at a salary of £750 per annum.



Mr. A. J. Sudul

Mr. Arthur J. Sudul, commercial manager of Falk, Stadelmann & Co., Ltd., retired on March 31st, having completed forty-eight years' service with the company. He was presented with a gold watch from the directors and a bureau from his colleagues on the staff. Mr. Sudul, who will continue to assist the directors in a consultative capacity, was closely associated with the late Mr. Max Falk in developing the sales organization of the company.

Mr. Frank Ayton, M.I.E.E., who is well known to many in the electrical industry, has decided to retire from his position as joint managing and works director of Ransomes, Sims & Jefferies, Ltd., after being with the company for about twenty-five years. Mr. Ayton, who is seventy-three, was educated at St. Mark's School (now the Imperial Service College), Windsor, and took evening classes at the City and Guilds College, Finsbury. He received practical training with Siemens Bros., Woolwich, and was on the staff of the company from 1893 to 1898 when he became an assistant to the late Sir Alexander Kennedy. In 1903 he was appointed chief engineer and manager of the Ipswich Corporation electricity supply and tramways and while holding this position was president (1919) of the Incorporated Municipal Electrical Association. He went to Ransomes, Sims & Jefferies in 1921. Mr. Ayton has always been a strong advocate of the electric battery vehicle and was one of the founders of the Electrical Vehicle Committee of Great Britain. Other positions which he has held have included membership of the Council of the British Engineers' Association and of the Mechanical Industry Committee of the British Standards Institution.

Colonel D. Pritchard has been appointed to the board of E. K. Cole, Ltd., as commercial director. During the war Col. Pritchard saw service in India, Malta, North Africa and the South-West Pacific, being concerned in the early days with radar operation and later holding important posts connected with supply administration, which brought him into very close touch with the radio and allied industries. In 1942 he was appointed assistant director (signal equipment) with the British Supply Mission in Washington, and subsequently he became Director of Radio Production for the British Air Commission, being responsible for the purchase of all radio and radar equipment. He also acted as secretary of the Inter-Service Radio Co-ordinating Committee, chairman of the Inter-Service Valve Committee and the Inter-Service Radio-Frequency Cable Committee.

Mr. William Waterson, an employee at the carbon-black plant of the General Electric Co., Ltd., has been awarded the Edward Medal in recognition of his gallantry in August last year when he played the principal part in the rescue of two men who were overcome in a brick chamber by carbon-monoxide fumes.

Mr. P. C. Pope, who has been secretary of the Institute of Fuel from its earliest days, resigned on March 1st, and will in future act as adviser to the Institute. The Council has recommended that he shall be elected an honorary member. **Mr. R. W. Reynolds-Davies,** B.Sc., has been appointed secretary. He has been deputy secretary since October last.

Mr. C. R. Dirs, who before the war was for eight years manager of the Hammersmith branch of Superlamp, Ltd., has been appointed manager of the Electrical Department of W. N. Froy & Sons, Ltd.

Mr. H. Matthews, M.B.E., assistant distribution engineer to the Teignmouth Electric Lighting Co., Ltd., has been elected a member of the Teignmouth Urban District Council.

Major J. W. C. Bird, M.B.E., A.M.I.E.E., assistant general manager, South Wales Power Co., has been appointed a Deputy Lieutenant for Monmouthshire.

Mr. T. V. Lironi

Mr. T. V. Lironi, A.M.I.E.E., has been appointed deputy borough electrical engineer of Birkenhead at a commencing salary of £852. Since 1941 Mr. Lironi has been mains and distribution engineer in Birkenhead Corporation Electricity Department and previously he held positions with Wolverhampton Corporation, Eastbourne Corporation, the Westmorland and District Electricity Supply Co., Ltd., Johnson & Phillips, Ltd., Portsmouth Corporation, and the Gosport and Alverstoke Electric Lighting Co.

Mr. O. V. S. Bulleid, chief mechanical engineer of the Southern Railway, has been elected president of the Institution of Mechanical Engineers.

Chester Corporation Electricity Committee recommends the appointment of **Mr. H. U. Hayes**, of Manchester, as chief assistant electrical and mechanical engineer.

Mr. A. D. Markland, one of the few remaining men who have been associated with B.T.H. turbine plant since the company began its manufacture in 1903, retired from the company's service on March 31st.

Mr. A. H. Jackson has been appointed chief electrical engineer and manager to the Turton U.D.C. as from May 1st. Mr. Jackson served his apprenticeship with Richardsons, Westgarth & Co. and subsequently held appointments in the West Hartlepool, Worksop, Nuneaton, Clacton and Reigate electricity undertakings.

Mr. H. J. Fraser, A.M.I.E.E., senior high-voltage distribution engineer in the Liverpool Electric Supply Department, has been appointed sales and service superintendent.

Mr. Clinton Cater tells us that he has been transferred from the position of field engineer to the Trinidad Leaseholds' joint interest oilfield at T.C.O./Crase to the company's refinery at Pointe-a-Pierre as head of a new department for the training of trade and student apprentices.

Mr. E. J. Spridgen, who for nineteen years has been with the Beds., Cambs. and Hunts. Electricity Co., as resident manager of the Ramsey (Hunts.) district for twelve years, has left the company to commence business on his own account. He is succeeded by **Mr. G. S. C. Jennings.**

The G.E.C. Dramatic Society presented "Indoor Fireworks," a farcical comedy by Arthur Macrae, in the Sixth Floor Theatre, Magnet House, Kingsway, W.C.2, from April 4th to 12th. The proceeds will be handed to the Infants' Hospital, where the Society had formerly endowed a cot.

Mr. W. H. Royall, who has been with the Ransome & Marles Bearing Co., Ltd., for twenty years, has been appointed East Midland area manager, with offices at Nicholas House, 4, Great Central Street, Leicester.

Mr. R. H. Wickenden, B.Sc., A.M.I.E.E., has been appointed mains engineer to the Kirkcudbright Electricity Department.

Mr. C. K. Lynton-Harris, formerly news editor in the News Division, Ministry of Information, has joined the Philips group of companies as press relations officer.

Mr. Bahattin Moltay of the Turkish Machinery House, Istanbul, is visiting London on business. His address is c/o Turkish Commercial Counsellor's Office, 47, Elm Park Gardens, S.W.10.

Obituary

Mr. T. S. Sheldrake.—We regret to learn of the death on April 2nd of Mr. Thomas Swinborne Sheldrake who was the editor of *The Times Trade & Engineering* until his retirement at the end of last year.

Mr. A. E. Knowles.—The death occurred on March 31st, at the age of seventy-five, after a long illness, of Mr. A. Edgar Knowles, chairman and managing director of the International Electrolytic Plant Co., Ltd.

Mr. F. Ffrench.—Mr. Frederick Ffrench, electrical engineer to the Horsham (Sussex) Council for twenty-seven years, was found dead in a room at the electricity works last week. Mr. Ffrench was to have retired in June.

NEW BOOKS

The Gyroscope and its Applications. Edited by M. Davidson, B.Sc. Pp. 256; illus. Hutchinson's Scientific & Technical Publications, 47, Princes Gate, London, W.7. Price 21s.

This book should fill a much felt want. The great extension in the applications of the gyroscope in connection with aircraft instruments has led to a need for some book on the subject, while the gyro-compass has been adequately treated only in manuals of navigation.

The editor apparently thought that no one person could deal with all sides of the subject, so that a mathematician was enlisted for the theoretical analysis at the beginning, and two technical men for the description of the actual pieces of apparatus. This gives a somewhat disjointed character to the work. On changing over to the technicians a slightly different language is used and they make use of expressions belonging to the trade.

At the beginning of the book, where an explanation of general principles is given, some assistance could have resulted from quoting Foucault's principle. This is usually stated thus: "A free rotating body when subjected to some turning force tends to set its axis of rotation parallel to that about which it is turned by the shortest path." From this the phenomenon precession follows at once. Finally so useful a book would have been improved by having an index.—W.C.A.

Books Received

The Design of Fans. By F. H. Slade. Third impression. Pp. 64; figs. 32. Princes Press, Ltd., 7, Princes Street, London, S.W.1. Price 5s. 6d., post free.

Electric Discharge Lamps. By H. Cotton. Pp. 435; figs. 216. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 36s.

The Commissioning of Electrical Plant and Associated Problems. By R. C. H. Richardson. Pp. 372; figs. 181. Chapman & Hall, Ltd. Price, 25s.

British Welding Industry

Memorandum by B.E.A.M.A. Sections

AT the invitation of the Director-General of Machine Tools, the Welding Sections of the British Electrical & Allied Manufacturers' Association have prepared a memorandum on the present position and the future of the British electric welding industry. It is explained that there are three Welding Sections covering respectively makers of arc-welding electrodes, arc-welding plant, and resistance welding machines. The B.E.A.M.A. Electric Welding Industry Committee deals with matters of common interest.

The first part of the memorandum relates to arc-welding and it is shown that the fourteen principal firms making electrodes increased their labour force from 1,440 in 1938 to 2,370 in 1945, i.e., by 65 per cent. The output of the industry in 1944 was four times the 1938 figure, amounting in value to £4,247,460 and comprising 1,416 million ft and 45,020 tons. In 1945 the corresponding figures were £3,103,300, 1,034 million ft and 34,200 tons. Of the total sales 25 per cent were for export compared with 18 per cent in 1938.

High Output per Head

As regards arc-welding plant the labour force is estimated at about 250 in 1938 and 800 in 1945; the output per head is extremely high, even for the electrical equipment manufacturing industry. It is stated that the number of arc-welding plants installed in 1938 was 2,750 with a value of £187,000. In 1944 the number rose to 12,100 and the value to £903,100, and in 1945 the number installed was 8,800 (£740,000). It is estimated that the total number of plants installed in this country increased from 20,000 in 1938 to 65,000 last year.

One factor which has encouraged the use of welding is the shortage of skilled workers in the foundry trade. It is emphasized that the machine and the electrode have a greater effect in producing sound welding than does the skill of the welder who can be trained in a few weeks, or at the most months, for general production work. A great deal of educational work is being done by makers of welding electrodes and plant but there is a shortage of designers and production engineers who understand the requirements and it is suggested that much needs to be done to encourage the inclusion of the subject in technical education schemes and in the curricula for the examinations of the engineering institutions. The manufacturers actively support research.

Referring to export trade, the memorandum says that American electrode makers are able to quote prices lower than the British on account of the high cost to British makers of core wire. This matter is being discussed with the British Iron and Steel Federation. Although the arc-welding electrode and plant manufacturers co-operate in the B.E.A.M.A. Export Groups they have not as yet found that combined market research or combined selling overseas offers any advantages.

The second part of the memorandum sets out the advantages of resistance welding and shows that the successful application of the process depends to a large extent on the design of the machine. The period immediately before the war was one of development and there was a prospect in 1938 that the progress made would place the firms concerned on a profit-earning basis in the next few years. This pioneer work proved of service in connection with the accelerated re-armament programme.

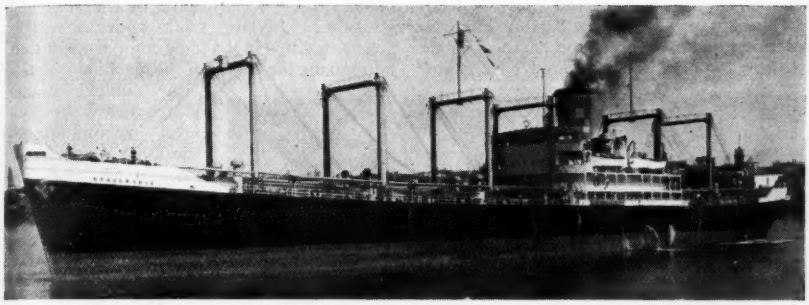
It is estimated that fourteen concerns producing resistance welding machines employed 750 workers. The value of the annual output rose from £192,000 in 1939 to £650,000 in 1945; in the latter year the total capacity of the machines produced was 78,000 kVA. The peak year was 1943 when 101,000 kVA of machines were produced valued at £861,000. It is estimated that at the present time there are 21,500 machines in this country totalling about 860,000 kVA.

Manufacturers are having to train designers and engineers who are competent to design the electrical and mechanical features of resistance welding machines. These machines, particularly when they are fully automatic in operation, are frequently installed as part of a production line. The possibility of encouraging technical colleges and similar institutions to pay more attention to the subject is being explored.

Ability to Meet Competition

Mention is made of the principal types of resistance welders and it is stated that industries which adopted them in wartime will almost certainly continue to use them and there are many industries in which resistance welding is likely to be introduced or extended. Research activities are referred to. At the present time about 20 per cent of the total output is exported; it is anticipated that this figure will increase when present handicaps are surmounted. The principal competition is from America but confidence is expressed in British makers' ability to compete.

In a final summary it is suggested that the existing contact between Government and the industry could be strengthened by the establishment of a joint advisory committee through which the views of the Government could be conveyed to the manufacturers and decisions reached by mutual agreement. Copies of the memorandum may be obtained gratis from B.E.A.M.A., 36, Kingsway, W.C.2.

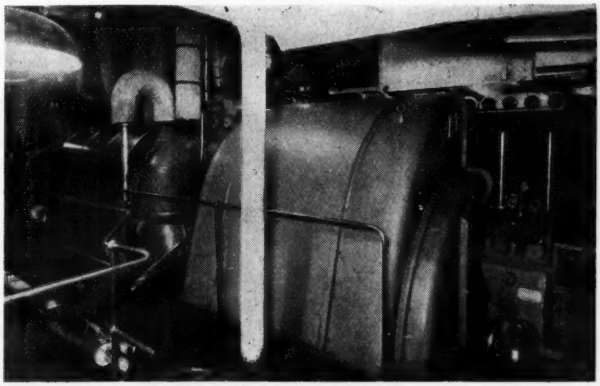


Turbo-Electric Cargo Ship

Arrangements in the s.s. "Beaverdell"

FOUR new cargo liners are being built for the Canadian Pacific Railway Co. for their London–Montreal service. The first, the *Beaverdell*, has just completed her maiden "round trip" and we had an opportunity of inspecting the ship recently at the Royal Albert Dock, London. The vessel is obviously designed for the handling of freight; the first thing to catch the eye are six pairs of columns ("Samson posts"), connected by cross-bars, which form the main components of a series of derricks. There are seven capacious holds (one of them for water ballast or cargo) covered by sliding hatches.

The ship has an overall length of 497 ft and a maximum breadth of 64 ft. The gross tonnage is 9,901 and net register tonnage 5,875. She is designed for a speed of about 16 knots and is propelled by a turbo-electric system which comprises a Parsons marine turbine and a 7,000-kW, 3,000-V, 3,450-r.p.m. Parsons three-phase alternator supplying energy to a 9,000-S.H.P. motor.

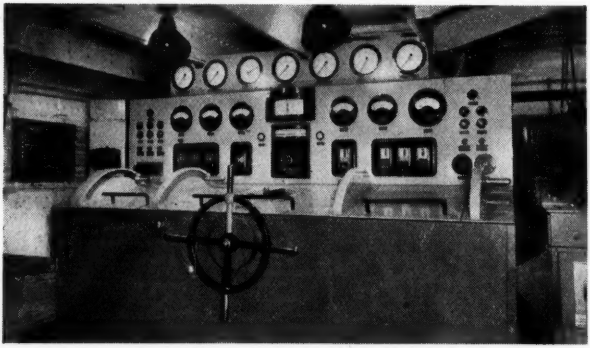


The 7,000-kW main turbo-alternator set

Steam is provided by a main boiler developed by Babcock & Wilcox, Ltd., in collaboration with Mr. John Johnson, the owners' consultant. An auxiliary boiler was developed in this way by James Howden & Co., Ltd. The construction of the main boiler is in general conformity with the well-known Johnson design except that the number of rows of tubes has been reduced to four each side. The superheater is arranged in the boiler casing at the port side of the steam drum, the flow of gases across the tubes being vertical. The reheater is similarly arranged on the starboard side of the steam drum, the gases from the two sides converging to pass through an economizer above the boiler proper and subsequently through a Ljungstrom air heater. Single induced- and forced-draught fans provide a balanced draught system. The boiler supplies steam at 850 lb per sq. in. and 850 deg F. The auxiliary boiler is designed to provide saturated steam at 180 lb per sq. in. for domestic

services, oil fuel heating and make-up feed.

The main turbine is of the Parsons impulse-reaction type, the h.p. section having a single two-row impulse wheel followed by reaction stages and the l.p. section having all-reaction stages. Speed control of the turbo-alternator set is effected by means of a regulator valve arranged in a chest on the steam line near the h.p. cylinder and operated by high-pressure oil. Overspeeding brings about a loss of oil pressure causing an emergency valve to shut.



Control desk for 9,000-S.H.P. propulsion motor

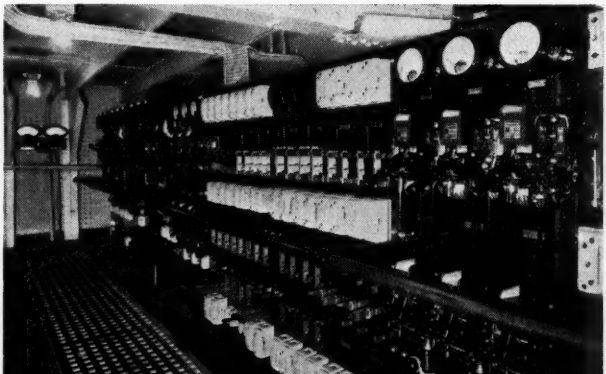
The propelling motor is arranged in two sections either of which can be run separately if necessary. Power may be provided for one section by an alternator arranged in tandem with one of three 400-kW auxiliary Diesel generators. This is sufficient to keep the vessel under way in an estuary or to take the ship into harbour should there be a major derangement of the main propulsion system.

This double unit also enables half power to be developed in the event of a fault in one section of the motor or its connecting cables. The motor is a 64-pole machine and is arranged to develop full power at 108 r.p.m.

The arrangement of the main units is unorthodox in that the main propelling unit is offset from the centre-line of the ship and staggered with the main boiler which is accommodated in the same compartment thus minimizing the length of the machinery space.

A cubicle immediately below the floor level accommodates the 3,000-V switchgear (Whipp & Bourne, Ltd.) which is operated from a control desk (A. Reyrolle & Co., Ltd.) above it. Starting, synchronizing and regulation of the main-motor speed are carried out by means of one control wheel so that the sequence of operations is independent of the operator who can devote all his attention to timing the operations to meet service conditions. All switches are mechanically operated. The selection of operating conditions is carried out by selector switches with robust mechanical interlocks to prevent mal-operation.

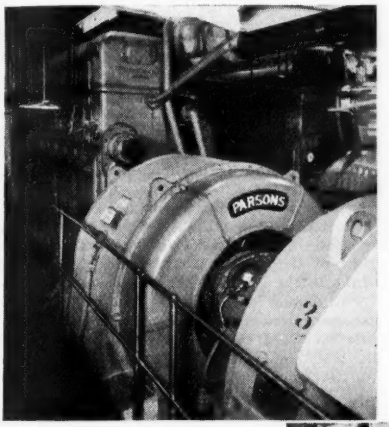
There are five of these switches on the control desk, viz., after half of motor; forward half; ahead and astern; main alternator and auxiliary alternator; and boosters No. 1 and No. 2. The control wheel rotates clockwise, each turn completing one operation. The fifth turn regulates the



Main 3,000-V switch and fuse gear

turbine speed by controlling the setting of the governor valve, the speed being raised by increments of 1 per cent from 20 per cent to 100 per cent of full speed.

Variation of propeller speed in either direction is obtained by altering the turbine speed. The direction of the propeller can be changed by reversing two of the three phases leading from the alternator to the motor; this is accomplished by a mechanically-operated interlocked switch on the control cubicle.



Auxiliary Diesel-electric sets

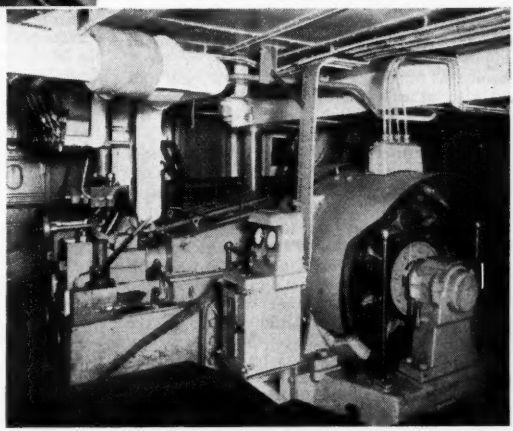
To simplify control of those auxiliaries directly associated with the rate of steaming of the main machinery not readily capable of being regulated automatically, namely the draught fans and the oil fuel pressure pump, a unified control system has been adopted whereby the speed of each unit is regulated from a single controller arranged at the starting position, the speeds being selected to correspond with 20, 40, 60, 80 and 108 r.p.m. of the propeller.

Power at 220-V D.C. is provided by three auxiliary Diesel-engine sets (W. H. Allen, Sons & Co.) for the refrigerating plant, 35- and 47-H.P. Laurence, Scott cargo winches (of which there are twenty), a 53-H.P. windlass (Clarke, Chapman & Co.), a 30-H.P. warping winch, ventilating fans, lighting and radio, radar and gyro compass equipment. There is also a 10-kW 220-V emergency set at boat deck level to supply selected circuits in the main switchboard when the other sets are shut down.

Loud-speaking telephones are installed for communication between the wheel-house, engine room and chief engineer; the supply for this service and for cabin bells and engine room emergency lighting is obtained from two 12-V batteries.

Refrigeration plant provided by J. & E. Hall, Ltd. (with control gear by Allen West & Co. Ltd.) deals with eighteen separate insulated compartments for the carriage of frozen meat with insulated provision chambers. Remote recording thermometers keep an accurate record of the temperature of the various spaces. The two CO_2 compressors of this plant are driven by 140-H.P. motors. The uninsulated spaces provided for miscellaneous cargo are equipped with mechanical ventilation.

Altogether there are 110 electric motors in the ship with an aggregate capacity of 1,786 H.P. The largest are the two compressor motors, the two boiler fan machines (44 H.P.) and those driving the windlass and winches.



Part of the refrigerating plant

The *Beaverdell* was built by Lithgows, Ltd., at Port Glasgow, to whom this work and the construction of the next two sister ships was sub-contracted by the Fairfield Shipbuilding & Engineering Co., Ltd. The latter company will build the fourth ship at its Govan yard.

Future Exhibitions

Ramsden Committee's Recommendations

THE Committee appointed by the Secretary for Overseas Trade to consider the part exhibitions and fairs should play in the promotion of export trade in the post-war era has recently reported. The Committee, composed of members broadly representative of trade and industry, was under the chairmanship of Lord Ramsden. One outstanding recommendation is that a " Universal International Exhibition " should be held in London in 1951 or as soon thereafter as practicable. Such an exhibition should have for its purpose the demonstration of our recovery from the effects of the war and mark the centenary of the great International Exhibition held in Hyde Park in 1851.

The report urges the need for a national trade fair and recommends that this need should be met by the revival of the annual British Industries Fair, to be held in May but with certain changes in its constitution and practice to improve its appeal. The first post-war Fair will be held in 1947. The main features in the Fair should, it is recommended, be varied annually so far as possible, and different industries should be given opportunities of staging corporate displays in central positions. Whilst, at present, the lack of suitable buildings requires the continuance of two sections in London and Birmingham, it is recommended that the Fair should eventually be concentrated in one centre and that an accessible site in London (preferably in Central London) should be secured with a view to the erection of permanent buildings to house not only the Fair but also other exhibitions. The Government should undertake financial responsibility for the site and the erection of buildings.

The Committee considers that official national exhibits are out of place at international fairs and recommends that United Kingdom industry should be left to decide for itself whether and to what extent, it will participate in such fairs. The Government should undertake official participation only when industry intends to participate on an adequate scale and on the occasion of some exceptional and outstanding event. Other recommendations relate to the assistance to be rendered by the Government with regard to industrial exhibitions organized in this country by representative trade associations and exhibitions of British goods overseas.

Re-erection of Factory

Company and Planning Authority

DURING the air-raids on Manchester in 1940 one of the Salford factories of Erskine, Heap & Co., Ltd., was destroyed and the company had to lease neighbouring factories to continue its business. These premises have to be vacated and in view of the importance of the company's production for home and export trade permission was given for the immediate erection of a factory on the old site.

The Manchester and District Regional Planning Authority, however, sought to restrict the existence of the new buildings to a period of thirty years in conformity with a plan which it proposed to operate. The company appealed to the Ministry of Town and Country Planning against the Authority's proposal and an inquiry was held in December last by a inspector of the Ministry. At this inquiry it was contended on behalf of the company that the limitation of the life of the buildings to thirty years was totally uneconomic and as they would be an integral part of the business with the company's existing factory the pulling down of the new buildings would render the old one useless. It was submitted that as the new buildings were in replacement of buildings destroyed by enemy action they were exempt from the consideration of the Development Authority under the terms of the General Interim Development Order, 1945, and that the restriction was unreasonable especially having regard to the mixed development of the area and the importance of the works to the city and the nation.

The deputy town clerk of Salford said that the proposed buildings were substantially different from the former ones and therefore did not come within the scope of the Order quoted, and the Salford city engineer also supported the Authority's decision.

The Ministry's decision was notified to the Salford Corporation on March 29th. The company's appeal was allowed unconditionally, the Minister stating that he accepted its contention that buildings constructed to have a life of thirty years would cost little, if anything, less than permanent buildings. He also noted that there was some doubt both as to the nature of the Corporations' re-development proposals and the time within which they would be carried out.

London J.E.A. Appointments

CRITICISM of the way senior appointments were filled by the London and Home Counties Joint Electricity Authority was made by Alderman O. Songest (Twickenham) at last week's meeting of the authority. The authority was asked to approve the appointment of new area officers who were members of the Institution of Electrical Engineers.

Alderman Songest said he was not " happy " about the matter because, if they had a person in the authority who had been with them nineteen or twenty years and given of his best, but was only an associate member of the Institution, he was not permitted to apply for senior posts. If he took another post he forfeited his superannuation contribution, which might be anything from £300 to £500. Alderman Songest suggested that in making appointments the authority should consider anyone in the service.

Alderman W. Stuart, who presided, said he was sorry a staff matter had been raised in public. If applicants were turned down it was because they were not considered suitable.

COMMERCE and INDUSTRY

Engineering Wages Agreement. Employment Statistics.

Higher Engineering Wages

AFTER protracted negotiations between the Engineering and Allied Employers' National Federation and the engineering trade unions an agreement on wages and conditions was arrived at last week. It provides for an increase from the first full pay week following April 15th of 6s. a week in the existing national war bonus of all adult male workers, with corresponding adjustments in the rates for apprentices and youths; payment for six bank holidays or the equivalent, commencing with Easter this year; and a guaranteed week of 34 hours when the industry ceases to be subject to the Essential Work Order in May.

It was also decided that a joint committee should be set up to consider the wage structure of the industry as part of a long-term policy. The unions had claimed an increase of 20s. per week in the basic rate.

Electricians' Increase

The increase in wages payable to journeymen electricians in the electrical contracting industry reported last week involves the suspension of the cost-of-living agreements until the second pay-day in January, 1947, and the stabilization of the new rates, unless there are wide fluctuations in the official cost-of-living index.

The proportion of the addition to wages for male labour under 21 years of age (except Category I) will be 6d. per hour for those between 18 and 21 and 3d. for those under 18. The basic rates will continue as a percentage of the journeyman's rate.

New South African Factory

A new factory of the First Electric Corporation of South Africa, Ltd., at Witwatersrand Deep in the Boksburg municipal area, is expected to be in production in June. In addition to continuing the manufacture of the present products of Alpha-Harris generators, electric motors, welding sets, transformers and domestic appliances, the corporation will also manufacture mining equipment, etc.—*Reuter.*

Manchester District Heating Proposal

Further consideration of the proposal by Manchester Corporation to provide a scheme of district heating in the Wythenshawe district was deferred at a meeting of the City Council last week. Alderman Regan had moved the adoption of a recommendation of the Housing and Wythenshawe Committees that the consultants who had advised the Council on the scheme should prepare detailed plans. The consultants put the cost of the scheme at a little over £1,500,000, with an annual income of £264,128, against an expenditure of £263,000. The average charge per house would be 5s. 1d. a week and it was estimated that fuel to the value of over 5s. 3d. would be saved by the householders.

In the debate Sir William Walker pointed out that the Department of Scientific and Industrial Research had stated that the Manchester scheme might cost as much as £2,500,000. Col. Dawson, who moved the reference back, thought that the Council should await the report of the committee on the subject of district heating appointed by the Ministry of Works.

Electrical Employment

Statistics published in the March *Ministry of Labour Gazette* show that employment in the electrical engineering industry in January was still lower than at mid-1945. The total number employed was 153,000, including 52,900 women. In mid-1945 the figure was 175,800 (69,700). There were, however, a larger number employed than in mid-1939 when the total was 132,900 (28,000).

In the electrical wiring and contracting industry 43,300 were employed in January, comparing with 37,500 in mid-1945 and 41,700 in mid-1939. The number of women employed (5,400) was almost double the 1939 figure.

As regards electrical apparatus and cable manufacture, the total of 239,800 (127,000) in January compared with 279,900 in mid-1945 and 195,900 (79,500 women) in mid-1939.

Figures of unemployment at February 11th (wholly unemployed, temporarily stopped and casuals) showed increases in all three sections of the electrical industry. The totals were as follows:—Electrical engineering 2,940 (1,044 women); electrical wiring and contracting 573 (82 women); electrical apparatus, cables, lamps, etc., 3,791 (2,072 women).

Level of German Industry

Last week there was published the allied scheme for fixing the future level of German industry. The principal aim is to guard against the resurgence of the German war industries and branches of this kind are not to be allowed to restart, except in special cases where domestic needs must be met until imports of the goods can be obtained. Other classes of industry have had their production figures fixed so that surpluses over home requirements can be taken as reparations; among these are the steel and metallurgical industries, heavy and light engineering, the electrical industry and chemical production. A third class, notably coal mining, has had its 1949 production level fixed but it is not intended to employ surpluses as reparations. Other industries will be unrestricted. Exports are not to be allowed to exceed the 1936 value.

Steel Wire Technique

At the Staff School of Frederick Smith & Co. recently a lecture was given by Mr. N. Davidson on "Wire-Drawing Machines, Past, Present and Future." In some introductory remarks, Mr. P. Smith, director of the School, pointed out that one of the main objects of the School was to draw attention to the constant changes which the company's processes had to undergo. It was necessary to take the precautionary research measures of ascertaining whether

certain markets would continue to exist and whether improvements in plastics and steel alloys would make it necessary for them to revise processing plans and plant design. At a later assembly Mr. C. B. Tolputt, the chief engineer at the company's Caledonia Works, Halifax, read a paper on " The Maintenance of a Steel Wire Mill."

Welding Course for Engineers

A course recently organized by International Combustion, Ltd., at its Derby works was planned to apply the principles outlined and to give to their draughtsmen and technical engineers an insight into the practical application of welding and an appreciation of the circumstances and conditions attached to the duty which a welded part has to perform. The course took the form of a series of evening classes spread over a period of eight weeks and took place in the students' own time.

A carefully planned syllabus covered the theory of metallurgy, heat treatment, strength of materials, the various types of welding and their application to design. The theoretical side of the course was augmented by practical demonstrations of heat treatment, various types of welded joint, and welding by electric arc, gas and atomic hydrogen. An examination was held at the close of the course and prizes were awarded to all obtaining over 60 per cent of full marks.

Manchester Engineers' Club

The thirty-third annual general meeting of the Engineers' Club, Manchester, was held on March 26th, when the president, Mr. C. G. Renold, presented the report of the committee and the accounts for 1945. Mr. Renold commented on the very satisfactory nature of the balance sheet, the continued increase in membership, and the increased number of engineering societies making use of the Club's premises for their meetings. In order to meet the demand, the committee was contemplating an extension of the premises. Mr. A. G. Livesay and Mr. E. Royle were re-elected hon. secretary and hon. treasurer respectively, for the ensuing year.

Catering Wages Boards

The Stationery Office has published a Report (Cmd. 6776, price 2d.) containing recommendations made to the Minister of Labour and National Service by the Catering Wages Commission for the extension of the scope of the Industrial and Staff Canteen Undertakings Wages Board and other Wages Boards, with a view to bringing within the scope of the appropriate Boards workers employed by local authorities in industrial and staff canteens and in catering establishments which serve the general public. The proposals are under consideration by the Minister.

Brown, Boveri Developments

Brown, Boveri & Co., Ltd., are giving a series of demonstrations at their Baden works from May 14th to 16th, to show the progress that has been made in the field of engineering during the years when Switzerland was practically cut off from the outside world. Papers are to be read on high-power long-distance transmission (a.c. and d.c.) up to 400 kV, traction equipment, limits of economic application of steam and gas turbines, " Velox " boilers and high-frequency engineering. There will be demonstrations of air-blast circuit-breakers, machine and transformer protection, a heat pump in the company's works heating system, special metering equipments, a new wind tunnel, corona phenomenal etc., and various excursions have been arranged, to local installations of interest.

E.A.W. Annual Conference

The twenty-first annual conference of the Electrical Association for Women will be held on May 10th at the Connaught Rooms, W.C.2. The chief guest and speaker at the luncheon will be Mr. Emanuel Shinwell, Minister of Fuel and Power.

Leipzig Fair

It is learned from the American Information Officer in Germany that the Leipzig Fair is to take place this year from May 8th to 12th. Permission to hold this old-established fair has been granted by the Soviet Government, Leipzig being within the Russian sector.

E.D.A. Carnival for E.I.B.A.

A cheque for £337 has been handed to Mr. J. Clement, chairman of the E.I.B.A. Newcastle Committee. This represents the net proceeds of a Victory Carnival sponsored by the Northern Counties Area Committee of E.D.A. and organized by a sub-committee under the chairmanship of Mr. W. F. T. Pinkney. Mr. and Mrs. Newey received the guests, over 1,000 in number. The evening was a brilliant social success and Mr. A. Parkin, recently returned from the Forces, showed that he has not lost any of his old organizing flair and ability.

Taxation and Engineering Industries

The Engineering Industries Association has issued to its members a synopsis of the Income Tax and Finance Acts, 1945, and a commentary on their operation in relation to the engineering industries. The purpose of the booklet, " Post-War Taxation and the Engineering Industries " (price 2s. 6d.) is to assist principals and directors of firms in formulating their future financial policy. Appendices contain examples showing the method of calculation for initial allowances and wear and tear allowances and the operation of E.P.T. deficiency relief.

Canadian Power Plant for China

The first of twenty Canadian built steam electric power plants will be shipped to China shortly, it is reported. These semi-mobile sets have a capacity of 500 kW and each weighs 100 tons.—*Reuter's Trade Service.*

Light Metal Founders' Association

This Association (25, Bennett's Hill, Birmingham, 2) was formed in 1939 to co-ordinate the technical and commercial aspects of the foundries so that the industry could speak with one voice on these matters; committees were formed to deal with the two aspects. Both these committees are being retained as it is thought that the type of advice previously required by Government Departments will be

equally useful to the buying public. It is also proposed to maintain the strict control over the quality and consistency of castings.

The Association is not in favour of price regulation but it has instituted a costing committee which will advise members on a system of foundry costing. A development committee has also been formed which will work in close co-operation with the Aluminium Development Association.

Domestic Science Course

An intensive course for electrical demonstrators is to be held at the London School of Electrical Domestic Science, Imperial Court, Basil Street, Knightsbridge, S.W.3, from July 29th to August 2nd inclusive. The syllabus covers the construction, use and care of cookers, washing machines, ironers and drying cabinets and demonstrations of vacuum cleaners, floor polishers and small apparatus. In addition there will be instruction in the fundamentals of electricity as applied to the home. The inclusive fee for the course is £4 4s. plus 7s. 6d. covering lunches for the five days.

New M.E.M. Film

To stimulate production the Midland Electric Manufacturing Co., Ltd., has just completed a new film entitled "Forward."

Miss Ruby Davis in the new film, showing one of the processes in porcelain manufacture

This was publicly shown for the first time last week to about a thousand of the company's employees and their friends. Preceded by a pre-war M.E.M. film, "Modern Electric Miracles," which gives a general insight into the company's activities, the new film draws attention to the wide range of interesting and attractive jobs that are now to be found in an up-to-date factory. The personnel manager is shown taking a new employee round the factory, introducing her to the various types of work undertaken there—porcelain component manufacture, press work, switch assembly, etc. Special emphasis is laid on the training schemes (which now form an important feature of the company's production methods), welfare, health and the many other services which assist in making the employee's life in the factory a happy one. The film concludes by drawing attention to the five-day week of 44½ hours which is now general throughout the works.

Trade Mission to Denmark

An industrial mission, headed by Sir Guy Locock, vice-president and formerly director of the F.B.I., has discussed with the three leading Danish industrial and commercial organizations the nature of Denmark's import requirements and how far Great Britain can meet them.

Quartz Crystal

At a meeting of the South-East London Technical Institute Electrical Engineering Society on April 4th a lecture on "Quartz Crystal" was delivered by Mr. R. H. Robins, who very clearly defined its characteristics and practical applications.

Non-Ferrous Metal Prices

Under the Control of Non-Ferrous Metals (No. 22) (Copper, Lead and Zinc) Order, 1946, which took effect on April 8th, the following increases in maximum prices per ton are nade: Copper, £10; lead, £6; zinc, £8; zinc sheets, £8; and zinc oxide, £7. The existing price list issued by the Directorate of Non-Ferrous Metals is to be replaced. Holders of licences to purchase these materials granted on or before April 6th, on application to the Directorate, may be enabled to purchase at the prices ruling on April 6th against such licences, up to and including April 22nd.

The Ministry of Supply list of prices of non-ferrous scrap metals has been withdrawn and will shortly be replaced by a new one.

Imports into British Guiana

Imports of electrical apparatus into British Guiana last year were valued at $165,260 compared with $137,865 in 1944. The principal supplying countries last year were: United Kingdom $39,100, Canada $50,650, and foreign countries $74,500.

American Exports to Russia

United States exports of electrical machinery and apparatus to Soviet Russia during the first nine months of last year totalled $87,345,000 in value. The largest item was radio apparatus, worth $22,090,000. In this line there was a steady increase in business as the year progressed. Diesel generating sets numbered 1,766 of a total value of $16,600,000 and 415 generators valued at $13,472,000 were sent. Exports of motors, starters and controllers amounted to $6,375,000, while other items were batteries ($2,867,000), motor-generator type welding sets (1,129 valued at $1,228,000), transforming or converting apparatus ($3,970,000), transmission and distribution apparatus ($3,108,000), searchlights

(149 valued at $888,000), industrial heating devices ($2,966,000), telephone instruments (57,521 valued at $2,589,000), and other telephone and telegraph apparatus ($4,900,000). The greater part of this trade was done during the first half of the year. During the succeeding quarter the rate of advance slackened, except in radio goods.

Resumption of Television

It has been decided that the television service from Alexandra Palace shall be resumed on June 7th. There will be transmissions daily from 3 to 4.30 and from 8.30 to 10 p.m. The pre-war system is being used (405 lines, sound 7·22 metres and vision 6·66 metres). Speaking at a luncheon of the Television Promotion Committee of the Radio Equipment Manufacturers' Association on Monday last, Sir Noel Ashbridge (deputy director-general, B.B.C.) said that transmission characteristics would be the same as before the war with a slight improvement in the band width. Mr. C. O. Stanley, chairman of the Committee, forecast a good production of television sets by the autumn and said it was hoped to produce them at prices within the reach of most people.

School Lighting

A review of the standards of school lighting required under the Education Act, 1944, is contained in a brochure entitled "Brighter Schools," issued by the British Thomson-Houston Co.'s Lighting Section, Bridle Path, Watford. Sections deal with the daylight factor, artificial lighting (with particular reference to fluorescent lighting), interior decoration and the B.T.H. Advisory Service.

Wiring Work at Coventry

Last week the Coventry City Council approved a proposal to set up a wiring section in the Electricity Department to deal with both municipal and private contracts. A letter was read asking that a deputation from local contractors should be heard before the Council voted on the question, and it was pointed out that the proposal would have serious effects upon a large number of ex-Servicemen who had set up in business.

Electrical Ceramics

Firms engaged in the production of ceramics for electric heating elements and switches have been notified that they will cease to be scheduled under the Essential Work Order on or about May 15th with the rest of the ceramics industry.

Tax on Deaf-Aid Batteries

As from a date to be announced purchase tax is to be no longer chargeable on batteries specially designed for h.t. supply for deaf-aid appliances (15 to 45 V, using layer-type cells not exceeding 6 mm. thick and zinc elements of which each face does not exceed 500 sq mm).

Trade Publications

Thomas Bolton & Sons, Ltd., P.O. Box 3, Widnes, Lancs.—Illustrated brochure (No. 115) on machined components in copper and its alloys for the electrical and other trades, including equaliser bars and connectors for batteries, busbars, terminals of all kinds, refrigerator and heater parts, valve filament connectors and anode cooling radiators.

Electro Dynamic Construction Co., Ltd., St. Mary Cray, Kent.—Illustrated and priced list (No. 5VS) technically describing variable speed a.c. motors; also leaflet (E.D. equipment) illustrating some special machines made by the company.

Watford Electric & Manufacturing Co., Ltd., Whippendell Road, Watford, Herts.—Illustrated catalogue (WP. 50) describing the "Pigral" completely automatic system of temperature control, which is a form of change-of-resistance thermometry.

Applications for copies of these publications should be written on firms' business notepaper.

Trade Announcements

Pye, Ltd., announce the extension of their activities to the scientific instrument field by the acquisition of the business of W. G. Pye & Co., Ltd., Granta Works, Cambridge, which attains its jubilee this year. Mr. Harold J. Pye remains managing director of W. G. Pye & Co.

British Rola, Ltd., announces that it has acquired 97 per cent of the shares of Celestion, Ltd., manufacturers of loudspeakers, valve holders, etc.

Marconi Instruments, Ltd., has established an office for western England at 10, Portview Road, Avonmouth, Bristol (telephone: Avonmouth 438), Mr. L. R. Nicholson, Western representative, is in charge.

The London office of Hick, Hargreaves & Co., Ltd., has been moved from 57, Victoria Street, to 1, Lancaster Place, W.C.2 (telephone: Temple Bar 7206).

The Carrier Engineering Co., Ltd., has moved from Sussex to 24, Buckingham Gate, London, S.W.1 (telephone: Victoria 6858).

The Johnson Engineering Co., Ltd., has moved its head office, works and stores to 319, Kennington Road, London, S.E.11 (telephone: Reliance 1412-3).

British Electric Meters, Ltd., have moved to Bangor, North Wales (telephone: Bangor 860).

Change of Name

Messier Aircraft Equipment, Ltd., of Liverpool Road, Warrington, have changed their name to Electro-Hydraulics (Messier), Ltd.

TRADE MARKS

APPLICATION has been made for the registration of the following trade marks. Objections to any of these may be made within one month of April 3rd:—

SECATRON. Class 9. No. 638,608. Radio receiving valves.—F. J. G. van der Bosch, Dunbar Works, Dunbar Street, West Norwood, S.E.27.

AVO. Class 10. No. 635,899. Electrical instruments, apparatus and contrivances for surgical, medical or curative purposes, and parts thereof not included in other classes. Also Class 11. No. 635,900. Apparatus, installations and fittings for lighting, heating, steam generating, cooking, refrigerating, drying and ventilating, and parts thereof not included in other classes.—Automatic Coil Winder & Electrical Equipment Co., Ltd., Winder House, 21, Douglas Street, S.W.1.

Manufacturers' Activities

Met-Vick Plant for Home and Export

WITH the transition towards peace-time conditions, the volume of orders for turbo-generating plant received by the Metropolitan-Vickers Electrical Co., Ltd., last year considerably increased, and the total rating of generators in hand exceeded 1¼ million kVA, a high proportion being for export. Probably the most noteworthy example is the 60,000-kW 3,000-r.p.m. three-cylinder set for the Battersea "B" station (London Power Co.), designed for steam conditions of 1,350 lb per sq. in. (gauge) and 950 deg F, the 11·8-kV alternator of which is to be hydrogen-cooled. Two partly completed alternators of the same rating for Littlebrook station (Kent Electric Power Co.) will also be hydrogen-cooled. Two-cylinder 3,000-r.p.m. turbo-alternators under construction include two of 52,500-kW for the new Croydon station and four of 45,000 kW for the new Cliff Quay (Ipswich) station. A further 52,500-kW unit for Portishead (Bristol) and two of the same capacity for Agecroft (Salford) will have alternators wound for 33 kV.

Overseas Orders

Representative of overseas orders are a 50,000-kW three-cylinder turbo-alternator for Pyrmont (Sydney) operating at 1,250 lb per sq. in. (gauge), and 925 deg F with a 33-kV alternator, two two-cylinder machines of 25,000 kW for South Fremantle and single-cylinder 20,000-kW units for Rhodesia and China as well as many smaller condensing and pass-out sets of from 1,250 to 12,500 kW for the Dominions, India, the colonies and foreign countries. In addition three 20,000-kW sets are being built for the Catalagzi station, Turkey, for which the Met-Vick Co. is the main contractor.

Vertical-shaft salient-pole alternators for hydro-electric plant include one of 21,600 kW and two of 16,000 kW completed and three of 30,000 kW (167 r.p.m.) in course of manufacture for New Zealand. Three other 16,000-kW machines are being built for the Far East and one of 5,000 kW and four smaller high-speed horizontal-shaft generators totalling 3,240 kW for the U.S.S.R.

Work is being done on 190,000 kVA of synchronous condensers, including two of 20,000 kVA for the Victoria Falls Power Co. and nine of from 10,000 to 20,000 kVA for Spain. A 30,000-kVA unit completed last year is believed to be the largest yet built in Great Britain.

Orders for nearly 100,000 H.P. of large induction motors of up to 3,600 H.P. have been received for home and export. A big proportion of large d.c. motors under construction is for Ward-Leonard operation of rolling mills and winders, one order covering sixteen 2,350-H.P. winder motors. Three rolling mills were put in hand with 5,000-H.P. (r.m.s.) 55- 120-140-r.p.m. motors to cope with 13,000-H.P. peaks. A further example is the equipment now being made for the largest powered 80-in. reversing cold-strip mill in the country, the main drive of which requires 2,500 H.P. Smaller motors are in big demand especially for machine tools, mining, oil-wells (Burma) and refineries. Fractional-horse-power machines are being made in large numbers—the bulk of these for export.

Three-phase transformers ranging from 12,000 to 66,667 kVA at from 33 to 132 kV are in various stages of production. For step-up transformers at power stations forced-oil water cooling is usual and no regulating tappings are provided; for main substations mixed natural and artificial cooling (ON/OB or ON/OFB) with auxiliary airblast is common and ± 10 per cent on-load tap changing is allowed for. Two three-phase 132-kV banks of single-phase coreless copper-shielded reactors, each bank having a reactance of 18 per cent of the feeder capacity of 90 MVA, which were supplied to the C.E.B., are said to be the largest of their kind yet made in this country. A number of 110/38·5/6·6-kV transformers with 110-kV on-load tap-changing were completed for the U.S.S.R.; the total weight of each with accessories was 104 tons which was specified to be lifted in one piece.

High-voltage Switchgear

Prominent among switchgear developments has been an order from the C.E.B. for twelve 132-kV 2,500-MVA air-blast circuit-breakers for Cliff Quay station. Others of the same type for 66 kV and 750 MVA are in hand for the Catalagzi station, Turkey. Oil-blast outdoor 132-kV tank-type breakers have been made for the C.E.B., the U.S.S.R., the West Australian and New Zealand Governments and the Adelaide Electric Supply Co. Single-break metal-clad units continue to be in demand, the majority for 33 kV; the largest order was for twenty-one of 1,500-MVA rupturing capacity for Calcutta, with Western Australia, Huddersfield, Sheffield and Bristol as further important purchasers. All the above orders include control- and relay-board equipments.

In the traction field good progress has been made in manufacturing twenty-eight 2,500-H.P. electric locomotives for the South African Railways in addition to the completion of ten 1,200-H.P. units. Work is also proceeding on electrical equipments for fifty-four motor coaches for the Reef and others for New South Wales and Brazil. Orders are in hand for several trolley-bus equipments, many of which are required for New Zealand.

Urmston Exhibition

All-Electric Kitchen and Utility Room

FOR display at a recent Housing and Town Planning Exhibition held at Urmston, Mr. A. E. Clarke, chief electrical engineer of the Stretford and District Electricity Board, designed an all-electric kitchen and laundry utility room suitable for a house which the Council proposes to erect. The plans provide for a living room, dining kitchen and laundry utility room. In designing the kitchen standard equipment has been used throughout, and the appliances have been made to fit the kitchen—not the kitchen the appliances, as has recently been the case with some kitchens shown to the public. Motion-study methods have been applied to the plan, and the kitchen is sectionalized into four main centres covering food preservation, food preparation, cooking and washing-up, and serving.

All-electric kitchen at the Urmston Housing and Town Planning Exhibition

A 4½-cu ft refrigerator contains perishable foodstuffs, with drawer space underneath for dry goods, vegetables, etc. A large work table in white vitreous enamel is provided for food preparation, with cupboard space above and below. The electric cooker is fitted with a radiant hot-plate having "Simmerstat" control, a metallized grill boiler, and automatic oven control. A standard Ministry of Works control unit is incorporated. Beneath the stainless steel sink there is ample storage space, and a novel serving shelf incorporates a garbage disposal unit, together with a cutlery drawer and crockery cupboard. An extension loud-speaker is housed under the rounded end of the serving table, and an electric clock on the wall of the dining portion of the kitchen is visible from the working section. A 2-kW panel electric fire warms the dining annexe.

The equipment in the utility laundry room comprises a "Servis" electric washer; a deep stainless steel sink, under which is fitted an 8-gal. wash boiler in case the housewife desires to boil personal clothing; a drop-down linen table; and large size drying cupboard. A broom cupboard incorporating an ironing board, together with a large general cupboard, is also provided. A separate display of post-war appliances, included a 2-kW chromium-plated combined fire and screen, thermostatically controlled irons, cleaners, etc.

Manufacture in Mexico

A RECENT survey of Mexico's needs for electrical goods (quoted in *Foreign Commerce Weekly*) indicated a market amounting in value to 14,500,000 U.S. dollars annually, and by 1951 an anticipated increase to between $25,000,000 and $30,000,000. In view of this demand the Industria Electrica de Mexico proposes to establish an electrical manufacturing industry at Tlaine-plantla, near Mexico City. Construction is planned to begin this year and will cost between eight and ten million dollars. Later expansion which envisages the manufacture of heavier equipment and a steam turbo-generator station will bring the total cost to about $17,000,000. Production will at first be limited to the smaller power apparatus such as motors, dynamos, transformers and switchgear, together with refrigerators, radio sets and irons. About two-thirds of the work will be in goods made at the plant and one-third in imported sub-assemblies and parts. The plant is designed to produce electrical apparatus and materials with an approximate value of $10,000,000 a year. During the period of construction a temporary assembly plant may be established to produce simple units from imported parts. The capital of the concern will be 51 per cent Mexican and the remainder United States.

Royal Engineers' War Memorial Fund

AN appeal for subscriptions to the Royal Engineers' War Memorial Fund is made by the chairman, Lt. Gen. Sir J. Ronald E. Charles, Chief Royal Engineer. With the object of commemorating the contribution made by the Corps to victory and to perpetuate the memory of the 10,000 gallant officers and men who gave their lives in its achievement, the memorial proposed will provide for those who have been disabled or otherwise suffered physically through the consequences of the war, by the provision of cottage homes, a convalescent home, or endowed beds in hospitals. Subscriptions should be sent to the hon. treasurer, Royal Engineers' War Memorial Fund, Gibraltar Barracks, Aldershot, Hants.

ELECTRICITY SUPPLY

Ipswich Radial Feeder Scheme. Fire at Thornhill Station.

Berwick.—ALL-ELECTRIC STREET LIGHTING.—The Town Council has adopted a plan for all-electric street lighting in place of the present arrangement whereby 23 per cent of the street lamps are electric and the remainder gas.

Birkenhead.—SALE OF LIGHTING FITTINGS.—The Electricity Committee has decided to sell lighting fittings at the showrooms as they become available.

APPARATUS FOR HIRE.—Permission is being sought to borrow £20,000 for the purchase of apparatus for hire.

Blackpool.—PAYMENTS FOR WIRING.—The Electricity Committee is to increase the payments to contractors for wiring for hired apparatus from 15 to 30 per cent above the 1939 rates.

BULK SUPPLY.—Cables are to be laid and switchgear and metering equipment provided at a cost of £16,320 for the bulk supply to the Thornton-Cleveleys U.D.C.

Bolton.—RATE RELIEF AND NATIONALIZATION.—By 39 votes to 35 the Town Council has decided to take £10,000 from the current profits of the electricity undertaking to help to keep the new rate as low as possible. Alderman Tong, chairman of the Finance Committee, made the point that with £406,000 in reserve the Electricity Department was in a satisfactory condition. As to the estimated deficit of £20,250 he contended that such estimates had proved wrong in the past. He added that to discontinue a practice that had been followed in previous years would affect the town's claim for compensation whenever nationalization of electricity undertakings came into operation.

33-kV TRANSMISSION SCHEME.—The Electricity Committee has considered a report by Mr. H. E. Annett, the electrical engineer and manager, upon a scheme for a 33-kV transmission from Back o' th' Bank power station to increase the supply available in the southern area and has decided to seek sanction to borrow £141,635 for the purpose. The engineer stated in his report that the maximum demand on the undertaking continued to grow with the re-opening of mills.

Bournemouth.—PURCHASE POWERS.—While applying for an extension of the time for exercising the Council's right to purchase the electricity undertaking, the General Purposes Committee is asking the Ministry of Fuel and Power why local authorities should continue the existence of their right to purchase having regard to the nationalization proposals of the Government.

Cheltenham.—FISH FRYING.—On the recommendation of the electrical engineer the Electricity Committee has agreed to offer a special flat rate charge of ¼d. per kWh for the operation of an electric fish frying range.

Chester.—FISH PASS.—In a letter to the Electricity Committee, the River Dee Fishery Board referred to the number of fish which were held up behind the hydro-electric works during the period of dry weather flow and expressed the view that the only satisfactory solution would be for the construction of a fish pass from immediately above the grating at the works. The Committee has asked for detailed proposals.

SODIUM LIGHTING.—The Watch Committee recommends the adoption of proposals by the city electrical engineer for lighting the main roads in Blacon with 85-W sodium discharge lamps at a capital cost of £2,732 and an annual cost of £7 14s. per lamp, and the side roads with 40-W sodium lamps at a cost of £6,718 and an annual cost of £5 7s. per lamp.

Eastbourne.—INSPECTION OF INSTALLATIONS.—In a letter the Trades Council expressed the view that better supervision should be given to electrical installations and equipment and that an installation inspector should be appointed to see that the requirements of the Corporation were strictly observed. The borough electrical engineer reported to the Electricity Committee that there were already seven men inspecting and testing installations, but that some electrical contractors did not notify the Department of additions or alterations to existing installations. He was asked to remind all contractors of the necessity to notify all alterations and additions they proposed to undertake.

Edinburgh.—NEW SWITCH-HOUSE.—An expenditure of £288,200 on a new switch-house at Portobello power station has been approved by the Public Utilities Committee. The estimated cost is made up of £176,000 for switchgear, £20,000 for reactors, £17,500 for transformers, £15,000 for cables, £27,500 for building and civil engineering work, £6,000 for control gear, and £26,200 for contingencies.

Ipswich.—DISTRIBUTION SCHEME.—The Council has approved a 33,000-V radial feeder distribution scheme, expenditure on the initial stages of which is estimated to cost £85,330 in 1946. The scheme also covers development of the electricity undertaking's requirements for the next 25 years, the total cost being estimated at £352,972.

Kidderminster.—STREET LIGHTING.—The Corporation is seeking sanction to borrow £16,800 for lighting classified roads by electricity.

Lichfield.—ELECTRICITY CHARGES.—A proposal by the City Council to increase electricity charges by 10 per cent has been deferred for further consideration.

Liverpool.—HEATING ON TRADING ESTATE.—The city electrical engineer and the city engineer and surveyor are to see what arrangements can be made to install heating equipment in the individual factories at the Kirkby Trading Estate with a view to the discontinuance, at the earliest possible date, of the existing heating service.

Markinch.—ELECTRICITY OR GAS?—In July last year the Town Council approved a proposal that houses on the Croft site should be "all-electric." Recently a motion was before the Council to rescind the former decision and fit gas cookers. During the discussion it was stated gas cookers were much more economical

to rent than electric, against which it was claimed that gas was an expensive item so far as household expenditure was concerned and figures were quoted to prove this. It was agreed that a special meeting should be called to go into the matter thoroughly.

Oldham. — RATE CONTRIBUTION. — When a request from the Finance Committee for a contribution of £9,231 to the rate fund was discussed by the Electricity Committee, the engineer (Mr. E. Binns), replying to a question, said that the position of the undertaking was good, but he thought they should dispose of profits to offset annual charges which were certain to arise later. With the exception of the deputy chairman (Alderman H. Shepherd) the Committee voted in favour of the contribution.

Rotherham.—DISTRIBUTION IMPROVEMENTS.—The Electricity Committee has approved a comprehensive plan for the rearrangement of the distribution system at a cost of £64,000.

ELECTRICITY FOR ESTATES.—An electricity supply is to be given to 120 houses on the Monkswood estate, Rawmarsh, at a cost of £3,800 and to 178 houses on the Highfield estate, Swinton (£4,500).

Sheffield.—HIGHER CHARGES SANCTIONED.—The Corporation has now received the approval of the Ministry of Fuel and Power to an upward revision of prices for electricity from April 3rd.

ELECTRICAL FOOD CONVEYORS.—The Corporation Health Committee has authorized the purchase of seven electrically heated food conveyors costing £350.

Sleaford.—CHANGE-OVER.—The Electricity Committee has asked the electrical engineer to prepare a scheme for the completion of the change-over.

Southport.—PROFITS FOR RATES.—A sum of £2,186 is being allocated from the profits of the electricity undertaking in aid of the rates (against £2,335 last year). The gas undertaking is to contribute £5,000 (nil last year) and the transport undertaking £10,000 (£5,000).

South Wales.—VIEWS ON POWER SCHEME.—The Abergavenny Rural District Council has voted 8 to 1 in favour of the South Wales Electric Power Co.'s scheme to construct a 100,000-kW power station at Llanover, in the Usk valley. The Finance Committee of the Borough Council also supports the plan. On the other hand Chepstow Urban District Council has decided to oppose the project.

Stalybridge.—BOARD'S ACCOUNTS.—Including the Glossop area acquired in 1939 and dealt with separately in the accounts, the Electricity Department of the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board sold 108·2 million kWh in 1944-45, compared with 112·9 million in the previous year. Power supplies decreased by 9 million kWh, this reduction being partly offset by greater consumption under the "all-in" tariffs. Revenue from the sale of electricity amounted to £422,813 (£422,066) and there was a net surplus of £4,824 (£19,874). The Board's chief engineer is Mr. J. Harwood Lumsden.

Stockton-on-Tees. — BOWESFIELD INDUSTRIAL SITE.—A proposal to install a new ring main feeder, two new substations, and to modify three existing substations, to furnish a supply of electrical energy to the Bowesfield Industrial site has been approved by the Council; the estimated cost is £34,025.

Todmorden. — STREET LIGHTING. — The Corporation has obtained sanction to borrow £4,500 for the extension of electric street lighting.

West Bromwich.—MAINS AND SUBSTATION.—The Electricity Committee is to extend mains and provide a substation at a cost of £5,965 for the provision of supply to the Hateley Heath housing estate.

Workington.—TRADING ESTATE.—The Electricity Committee has agreed to provide supply of 1,000 kVA to Sir Alexander Gibb & Partners, consulting engineers, who are developing the Salterbeck trading estate.

York.—SUPPLY TO OSBALDWICK AREA.—The Electricity Committee is seeking sanction to borrow £8,119 for a substation, cables, etc., to meet the increased demand in the Osbaldwick area.

Yorkshire.—FIRE AT POWER STATION.—A fire, believed to have been caused by a flash of lightning, affected the switch-room at the Thornhill Power Station of the Yorkshire Electric Power Co. last week and electricity supplies were cut in Calder Valley, Spen Valley and other parts of Yorkshire, including parts of the Bradford area. The supply was resumed after three-quarters of an hour, but the N.F.S. were working on the outbreak for several hours. Firemen in special respirators tried for some time to locate the seat of the fire and several of them were affected by the thick smoke fumes, one being taken to hospital.

TRANSPORT

Brighton.—TROLLEY-BUS ROUTE EXTENSION.—Orders are being placed at once for materials required for the proposed trolley-bus route linking Patcham with the Beaconsfield-Preston Drove services.

Glasgow.—NEW TRAMS AND TRAMWAY EXTENSIONS.—The Transport Committee proposes to construct a new tramway from Knightswood to South Drumry at estimated cost of £26,000. A tramway siding in Renfrew is recommended to meet the requirements of the employees of Babcock & Wilcox, Ltd., on condition that half of the estimated cost of £13,860 is borne by the Company. The Committee has also decided to place an order for 100 new tramcars of the "Coronation" type, involving an expenditure of £540,000.

Holland.—ELECTRIC LOCOMOTIVES. — Orders have been placed in Switzerland for ten electric locomotives by the Nederlandsche Spoorwegen. The mechanical parts will be built at the Locomotive Works, Winterthur, and the electrical gear by the Maschinenfabrik Oerlikon. The machines are to be rated at 4,400 H.P. and their weight will be about 100 tons. They are intended for either passenger or goods services and their speed can be as high as 95 m.p.h. to be in line with the requirements of the Dutch passenger traffic. Each locomotive will have two current collectors, and can be driven by one man, either forward or in reverse; each end of the loco will be similar and moderately stream-lined. It is expected that the first one will be ready in 1947.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Wall-mounting Radiators

SIX new wall-mounting radiators announced by BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, London, W.1, are designed to fix direct on to the wall requiring no form of insulation and no surround or cut out. Fixing is very simple, involving the use of only three or four screws. The option of a vertical reflector unit or a horizontal firebar type element is given by 1-kW models 604 and 605, while recessed switches, easily operated, yet out of sight, are a feature of the slightly more expensive 600 and 601 models, which are respectively of the 2-kW and 1-kW horizontal reflector type. An attractive illumination effect is obtained in the two 2-kW "Sunberry" models, an orange glow being emitted around the sides, and in the case of the larger (horizontal) type, from the top as well. The design is such that a certain amount of convected heat is provided in addition to the radiated heat. All models are available either in "Berrybronze" or stove enamelled cream. The bodywork is sheet steel and the reflectors of a non-ferrous alloy.

"Sunberry" and (right) No. 600 wall-mounting radiators

Battery Chargers

The latest product of EASCO ELECTRICAL, 6, Brighton Terrace, London, S.W.9, is the "Rectostat" for charging 6- and 12-V accumulators at 1 to 3 A with 60-W maximum rating. The case is circular with perforated sides, 9½ in. in diameter and 4¾ in. deep, arranged for wall mounting and blue enamel finished, 9 lb in weight. Inset in the front end-cap, which is illuminated by a hooded pilot lamp, is a calibrated ammeter in the centre with a rotary switch to the right for adjusting the charging rate and a magnetic trip overload switch to the left. Below are two clearly marked battery connection terminals while input from the mains is through a non-reversible plug and socket to a selenium bridge metal rectifier.

The charger primarily designed for home use (radio and car batteries) by PARTRIDGE, WILSON & CO., LTD., Evington Valley Road, Leicester, is assembled in a steel case for wall or shelf mounting. The vacuum-impregnated transformer is double wound and the "Drimet" selenium rectifier is bridge connected for full-wave operation. Control is by a three-way selector panel and two-pin fused plug. The ammeter is calibrated for charging rates up to 2·25 A, the consumption being 8 W at no load and 42 W at full load. This charger is 8 in. high, 7 in. wide and 6 in. deep, weighing 9½ lb.

Twelve new models have been included in the range of 40 different types offered by LEGG (INDUSTRIES), LTD., Williamson Street, Wolverhampton. Single-, double- and triple-circuit models are made, incorporating full-wave selenium rectification. The double-wound shell transformer is tapped for adjustment of charging rate; most models have two 6-position switches, those furnishing outputs of over 15 A have three 4-position switches while sliding rheostats are fitted to radio battery chargers. Input is through a double-pole rotary switch and rewirable "Slydlok" fuses. The cubicles are of mild steel.

Fluorescent Lighting Fittings

Among fluorescent lighting fittings made by HERMAN SMITH, LTD., Reliance Works, Dudley, Worcester, is one type in two distinct parts for convenience with safety.

Withdrawing a three-pin plug from the connector socket at the side and simply loosening a knurled screw at one end of the trough reflector permits the chassis, on which the tubular lamp and its control gear are mounted, to drop right out of the trough for cleaning and quick replacement. The parts are interchangeable while the patented tubular lampholders are spring loaded to enable bayonet-cap lamps to be changed as easily as an ordinary filament bulb, needing only to be pressed in and half-turned. The holders are rigidly fixed in diecast aluminium brackets.

Aluminium "Smithlite" fittings are two-thirds the weight of the maker's standard steel type and half the weight of vitreous enamelled steel models. The aluminium is electrolytically treated and coated white inside.

Air Filter

A circular air cleaning device arranged to be mounted on a wall or the ceiling has been named "Kleenair" by APPLEBY & CO., Buckingham Gate, London, W.C.1. Air is drawn in through a central grille, passing through a chemical filter, and is discharged by a 40-W enclosed fan through circumferential louvres.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Associated Electrical Industries, Ltd., reports a net profit for 1945 of £542,817, compared with £467,543 for 1944; to this is added £320,454 brought forward, making £863,271. It is proposed to transfer £150,000 to special reserve, as last year, and to pay an ordinary dividend of 10 per cent (same); a balance of £335,800 is carried forward. The report refers to changes in the directorate during the past year.

A letter signed by the chairman, Mr. Oliver Lyttelton, accompanies the report and sets out the reasons for a proposed increase of capital. Reference is made to additions during the war to the plant and equipment of a number of companies in the group which have been financed partly out of the companies' own resources and partly by bank loans which stood at £2,300,000 at the end of last year. A programme of further expansion has been provisionally approved which during the next two or three years will cost about £4,000,000 more than the normal amount spent on renewals and extensions. Part of this sum will be met by refunds of E.P.T. but the directors have decided that it would be advantageous to increase the company's capital by about £2,500,000. It is accordingly proposed to increase the authorized ordinary capital from £5,161,950 to £6,000,000 by the creation of 838,050 new shares (to be converted into stock when fully paid up). (The total capital will thus become £8,696,050). With the balance of 215,112 shares remaining unissued there will be 1,053,162 shares available for subscription, 25,000 shares having been issued on December 31st last in part satisfaction of the acquisition of Premier Electric Heaters, Ltd.

The proposals will be placed before an extraordinary general meeting following the annual general meeting on April 10th and if they are approved ordinary stockholders will be offered one new share for every £5 of stock held, at 50s. per share. A balance of approximately 63,990 shares will be offered at the same price to the executive directors and senior officials of the company and its subsidiaries. The new shares will be converted into stock and will rank in all respects with the existing stock, participating to the full amount in any ordinary dividend declared in respect of 1946. If fully subscribed the proceeds of the issue will amount to £2,632,905 and the directors expect that current earnings alone will be amply sufficient to maintain the present rate of dividend.

Lancashire Dynamo & Crypto, Ltd.—Reviewing the accounts at the annual meeting, Mr. H. W. Bosworth (chairman) said that the balance sheet showed a strong position. The Trafford Park and Willesden works had very full order books. A comprehensive reconstruction scheme had been carried out at the Foster works, Wimbledon, to give increased and economical production. Crypton Equipment's temporary works at Bridgwater had been fully occupied and had earned adequate profits. It had been decided after careful review of the labour position to establish the company on a permanent basis at Bridgwater and a suitable site had been purchased; it was hoped that the new factory would be operating by the end of this year. The food machinery business had been taken over by Crypto, Ltd. With parts and motors supplied from the main Willesden works, assembly and finishing of the products was carried out in a modern factory recently acquired in the Willesden district.

Bepco Canada, Ltd., an associated company, had, in spite of great difficulties, earned a satisfactory profit. The president, Mr. C. G. Abbey, was now in this country discussing the problem of deliveries and prices. The company's South African business had increased in recent years and it was hoped that the formation of their own trading company, registered in Johannesburg, would lead to still further developments.

With regard to the Government's call for increased exports, he said that overseas buyers would be antagonized if prices were unduly high, and opportunities were daily being lost by the inability of the industry to offer reasonable deliveries. The Government could help by speeding up release of labour and impressing on management and labour alike the urgent need for increased output per man-hour, the maximum efficiency of management and the pursuit of a bold and enterprising policy.

Ericsson Telephones, Ltd.—In the absence of Sir Harold A. Wernher (chairman), Air Commodore H. Leedham (managing director) presided at the annual meeting and read the chairman's speech. In this the company's war activities were reviewed, mention being particularly made of its outstanding radar achievements. With regard to future prospects, the chairman looked for increased trading within the Commonwealth. At home there were something like 300,000 applications for new telephones outstanding, and many others were doubtless withheld pending an improvement in the supply position. Automatic telephone exchanges would be urgently required as part of the country's rehabilitation programme, but first it was necessary for the buildings to be given a higher degree of priority.

Telegraph Construction & Maintenance Co., Ltd.—The accounts for 1945 show a net profit of £53,985 (against £50,710 for 1944), after deducting £71,478 (£264,004) for taxation. A sum of £22,000 (£28,000) is allocated to contingencies and, as already reported, the ordinary dividend is maintained at 10 per cent by a final payment of 5 per cent. The carry-forward is £44,176 (£42,297).

The Brush Electrical Engineering Co., Ltd., is convening an extra-ordinary general meeting to be held on April 16th for the purpose of authorizing the board to borrow up to £1,750,000, or the amount of the paid-up capital, whichever is the greater, in lieu of the present maximum of £750,000. As soon as the accounts for 1945 are issued the directors propose to apply to the Capital Issues Committee for sanction to issue additional share capital. It is stated that the company has now substantially changed over

to peace-time production, including a large amount of export trade, and in the current year it is hoped to exceed a turnover of £4,000,000.

Lancashire Electric Light & Power Co., Ltd.—Reviewing the company's operations at its annual meeting Sir Joseph Nall (chairman) said that the demands on the undertaking were now showing healthy and progressive expansion, but there was some temporary decline during last year. In 1945 they sold 1,175 million kWh (including surplus to the C.E.B.), which compared with 1,401 million kWh in 1944. This reduction was almost entirely due to the cessation of production in important war factories in their area.

In January of this year the maximum demand on the power company's generating plant reached the record figure of 225,000 kW. The extension of the Kearsley power station was proceeding and large developments of the distribution system were in hand. The proceeds of the recent issue of 1,000,000 new cumulative preference shares would meet the requirements approximately up to the end of this year and further proposals would be made in due course. Judging by the many applications for supplies, the present heavy calls on their sales and development staffs would continue for an indefinite period.

The Lancashire Electric Power Co. had just completed forty years in the service of the county and it was generally admitted that had it not been for the company's persistence electricity would not have reached when it did the large number of rural and small urban districts now efficiently served. To-day 43 per cent of the farms in the area were connected. Provided no political upheaval disturbed their plans, the remainder could be connected within five years without penalizing industrial and urban users. To expedite rural extensions they had used a cable-laying plough and when the first contract commenced engineers from neighbouring undertakings were invited to be present. Would this fruitful spirit of co-operation and friendly rivalry survive if the threat of nationalization were allowed to breed fear of loss of position with the inevitable manœuvring for position that would assuredly follow?

In conclusion the chairman paid a tribute to the outstanding services of Mr. C. D. Taite, who has just retired from the position of engineer and manager.

Midland Counties Electric Supply Co., Ltd.—The company's achievements during the past thirty-three years were surveyed by the chairman, Mr. W. Shearer, at the annual meeting to show that they, in common with other major supply undertakings, had a record of which they could be proud. State monopoly of this key industry, he was convinced, would be detrimental to the future welfare of the country. He gave examples, both at home and abroad of public services being taken over by the State, and claimed that, in general, they had been unremunerative and a burden on the taxpayer.

Dealing with rural supplies in the company's area, he said that during January and February they had actually dealt with supplies to a hundred additional farms, and the total now connected was about 8,000. During 1945 the last of the new 30,000-kW sets directed for the Spondon station came into operation and the total plant installed there and at Avon and Hinckley was now 228,000 kW. An agreement had recently been completed between the Derby and Notts Company and the Central Electricity Board for a new 300,000-kW generating station on a site at Staythorpe, to the south-west of Newark. The first section of two 50,000-kW sets and six boilers was scheduled for completion before the end of 1949.

Reductions in their tariffs for industrial and domestic supplies and meter rents were made in 1942, 1943, 1944 and 1945, and already this year a further reduction affecting bulk and industrial supplies was being put into effect. Actually, based on sales in 1945, there was a loss of revenue of £460,000 from these tariff alterations. Last year 765 million kWh was sold compared with 808 million in 1944, the decrease being entirely due to the cessation of wartime loads; even so the sales compared with 490 million kWh in 1939. Although the falling-off might continue during the first half of this year, he pointed out that there was more power load already negotiated, or being negotiated, than ever before. Sales to domestic consumers last year increased by 11½ per cent.

Clyde Valley Electrical Power Co.—Dr. Robert Robertson, chairman of the company, who presided at the annual meeting, said that for the first time since the depression years of 1931 and 1932 the accounts showed a recession in revenue. Industrial sales reached their peak in 1943 and last year there was a decrease of 16 per cent compared with 1944. In the second half of the year the fall was 21 per cent and there had been a further decline in the early part of this year. At the same time there had been a considerable increase in domestic consumption, sales in 1945 exceeding those in 1938 by 110 per cent, but being in the main at the lowest step in the domestic tariff this had led to a diminution in the average price received. With regard to the future, he said that seven new industrial estates were being constructed in their area besides a hundred housing estates varying in size from 10 to 1,000 houses. They were also anxious to proceed with the development of the remainder of their area, in which 80 per cent of the premises were already being supplied. On the question of nationalization, he said that he was as firmly convinced as ever that it would be entirely against the interests of the community.

Scottish Power Co., Ltd.—Of the net revenue for 1945 of £615,684 (against £551,705 for 1944) income tax absorbs £311,503 (£278,347). As already reported, the total distribution on the ordinary capital is 9 per cent (last year 8 per cent). General reserve receives £24,298 (£22,750) and £19,090 (£17,607) is carried forward. The consolidated accounts of the company and its subsidiaries shows that net revenue, after providing £279,834 (£304,331) for income tax, was £371,289 (£348,026).

The Kent Electric Power Co. reports a balance of revenue for 1945 of £418,349, compared with £453,080 for the preceding year, plus £73,494 (nil) transferred from contingencies and other reserves. Deductions are: interest paid £100,685 (£108,258), sinking fund £3,498 (£3,396) and depreciation £186,638 (£188,552). A sum of £50,000 (£20,000) is provided for taxation and general reserve receives £100,000 (£55,000); last year a sum of £30,000 was allocated to

contingencies. With a final dividendof 5 per cent the total distribution is maintained at 8 per cent, and £164,908 (£155,886) is carried forward.

The Adelaide Electric Supply Co., Ltd., in a statement issued in Adelaide last week concerning the South Australian Government's proposals for acquiring the company's undertaking, declares that the Electricity Trust Bill discriminates between payment for shares held in England and Australia. Further, it is contended that the Bill abrogates the company's contract with its stockholders and avoids the basis of compensation set out in the company's private Act of 1897.

Vactric, Ltd., which last year paid a total dividend of 22½ per cent on its ordinary capital, is making no distribution this year. The hiatus in production inevitable in the change from war to peace has given rise to a position in which the accounts will show a substantial net trading loss. The directors add, however, that the decision to transfer the company's main activities to Scotland is now being fully justified; production at the present time is 2½ times the pre-war figure and is still increasing.

Sangamo Weston, Ltd., reports a profit for 1945 of £2,493 after allowing £926 for tax; this compares with a profit of £28,379 for 1944, having deducted £31,944 tax. The first and final dividend is maintained at 15 per cent, the carry-forward being reduced from £153,403 to £142,902.

The British Oxygen Co., Ltd., to mark the sixtieth anniversary of its incorporation, has recommended a special dividend of 4 per cent in addition to the final 8 per cent dividend on the ordinary stock, making a total of 20 per cent for the year (against 16 per cent).

The Superheater Co., Ltd., proposes to pay a final dividend of 27½ per cent. This is the same as last year but makes the total 42½ per cent as compared with 40 per cent. The net trading profit was £136,904 (against £121,044).

The Urban Electric Supply Co., Ltd., reports a net balance for 1945 of £19,101 (against £19,612 for 1944). It is proposed to pay a final dividend of 4 per cent, again making 8 per cent for the year, leaving £62,618 (£57,517) to be carried forward.

The Gateshead & District Tramways Co. reports a net profit last year of £11,241 (against £11,383). The ordinary dividend is again 10 per cent and £45,117 (£45,789) is carried forward.

The Electric Supply Corporation, Ltd., proposes to pay a final dividend of 6½ per cent, again making 10 per cent for the year.

A. Reyrolle & Co., Ltd., recommends a final dividend of 7½ per cent, making 12½ per cent for the year (same).

New Companies

Cossor Instruments, Ltd.—Private company. Registered March 13th. Capital, £10,000. Objects: To acquire from A. C. Cossor, Ltd., all or part of that company's right, title and interest in any patents, applications for letters patent, brevets d'invention, etc., in respect of inventions of any kind, including domestic appliances, medical instruments and engineering equipment. Directors: T. A. Macauley, Flat 41, 3, Grosvenor Square, W.1 (chairman of A. C. Cossor, Ltd.), and three others. Registered office: Cossor House, Highbury Grove, N.5.

Enfield Cables (Eire), Ltd.—Private company. Registered in Dublin March 29th. Capital, £5,000. Objects: To act as agents for and representatives of Enfield Cables, Ltd., and their subsidiaries, etc. Subscribers: W. T. Jenner, 19, Queen Anne's Grove, Bush Hill Park, Enfield, and S. G. Holmes, 92, Wricklemarsh Road, Blackheath, S.E.3.

"Glowgem" All Electrics, Ltd.—Private company. Registered April 1st. Capital, £1,000. Objects: To carry on the business of electrical, wireless, heating and ventilating engineers, etc. Directors: J. K. Carles, 24, Artesian Road, W.2; and A. S. Willson, 48, Hickman Road, Chadwell Heath, Essex. Registered office: 78, Westbourne Grove, W.2.

A. G. Allen & Co., Ltd.—Private company. Registered March 28th. Capital, £5,000. Objects: To acquire the business of an electrical contractor and radio engineer carried on at 4, Bridge Road, Wembley Park, as A. G. Allen & Co. Directors: A. G. Allen and Elsie B. Allen, both of 4, Bridge Road, Wembley Park, which is the registered office.

E. F. Ferris, Ltd.—Private company. Registered March 20th. Capital, £1,000. Objects: To acquire the business of electrical and radio engineers and contractors carried on by Ernest F. Ferris and Nellie G. Ferris as E. F. Ferris & Son. Directors: E. F. Ferris and S. C. Ferris, both of 84, Oakhampton Road, Hendon, N.W.7, and Nellie G. Ferris, 8, Holders Hill Avenue, Hendon, N.W.4. Registered office: 96, Brent Street, Hendon, N.W.4.

Bowmac Electric, Ltd. — Private company. Registered March 14th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures and general electrical plant, machinery, appliances and supplies, etc. Directors: D. MacIntyre, Rosebery Road, Epsom Downs, and two others. Registered office: 86, Richmond Road, Kingston-on-Thames.

Fluorescent Industrial Installations, Ltd.—Private company. Registered March 8th. Capital, £500. Objects: To carry on the business of electricians, etc. Subscribers: J. H. Bowden, 57, Kenilworth Avenue, S.W.19, and two others. Solicitors: Zeffertt Heard & Co., London, E.C.2.

Liquidations

Lacrinoid Products (Holdings), Ltd.—Meeting, Creechurch House, Creechurch Lane, London, on May 20th, to hear an account of the winding-up by the liquidators, Mr. L. Lazarus and Mr. C. Harris.

Bankruptcies

K. Bader, electrical equipment manufacturer, lately carrying on business at Westmoreland Road, Hendon.—Last day for receiving proofs for dividend April 18th. Trustee, Mr. S. H. Gillett, 24, Basinghall Street, London, E.C.2.

STOCKS AND SHARES

THE Budget speech comes through after the Stock Exchange is closed, and, therefore, it is not until the following morning that its effect makes itself felt throughout the markets. Prices in all the investment departments rallied on the eve of Mr. Dalton's announcement, the principal feature being a substantial improvement in the prices of British Government securities. The gilt-edged issues dealt with in these columns have undergone no alteration, except for a slight hardening in the Central Electricity Board's stocks. On the whole, prices show a firm tendency, dollar stocks being advanced; International Tel. & Tel., for instance, regained the four points which the price lost a week ago. Electricity supply shares have moved but slightly. Stock Exchange business, speaking generally, was held in leash by the Budget uncertainty. Now that people know how they stand in regard to taxation, it is thought that markets will reflect public willingness to employ money which, for some weeks past, has been held back pending announcement of the Government's intentions.

Home Electricity Supply

Full accounts of Metropolitan Electric Supply for 1945 present a now familiar picture. An increase of revenue was rather more than cancelled out by higher expenses, but among the appropriations, the contingency account receives nothing, against £175,000 in the previous year. In the result, the carry-forward is only slightly lower after the increase in the dividend from 8 to 9 per cent. At 42s. ex dividend, the shares pay 4¼ per cent on the money.

British Power & Light also paid a bigger dividend, despite a smaller trading profit. Lower provision for E.P.T., it was also explained at last week's annual meeting, enabled the company to pay a total of 8, against 7 per cent, for the year, while an additional 2 per cent in the form of a cash bonus was recommended as a result of the amount released from tax provisions of previous years. At 32s. the shares return 5 per cent on the money, without taking the 2 per cent bonus into account. Electric Finance & Securities are ¼ down at 56s. Midland Electric Power 42s., Electric Supply Corporation 44s. and London Associated 26s. are also lower.

Price Fluctuations

In the radio-wireless market, Pye deferred are the firmest feature, rising to 40s. Cossor, after being neglected at the same price, came into demand up to 41s. 6d., and E.M.I. advanced 1s. to 32s. 6d. Radio & Television, née Philco, went back to 10s. Canadian Marconi at 18s. 9d. gained the pence. Decca Records fell ⅛ to £3.

De la Rue at 10⅛ are higher on a little demand that came upon a market ill-supplied with floating stock. British Insulated Callenders recovered to 46s. 6d. Ward & Goldstone retain last week's rise of a florin to 36s. 6d. Thorn Electrics at 31s. 3d. have gained 9d. Crompton Parkinsons at 32s. and Metal Industries "B" at 50s. are better. On the other hand, Reyrolle, 73s. 9d., Ericsson Telephone, 51s. 3d., Falk Stadelmann, 42s. 6d., Johnson & Phillips, 81s. 6d., British Vacuum Cleaner, 37s. 6d., are easier on the week. Tokyo Electric sixes at 33½ regained 3 points.

Fresh Capital

Brush Electrical Engineering proposes to raise fresh capital as soon as the accounts for 1945 have been issued. Meanwhile, the directors are seeking authority to enlarge their borrowing powers. A marked expansion of trade is in view in the home and export markets, for a figure of £4 millions is mentioned as the volume of turnover which may call to be financed. For 1944 the company paid 10 per cent, and the interim for 1945 was maintained at 4 per cent. The 5s. shares are quoted at 11s. 6d. to yield £4 7s. per cent on a 10 per cent distribution.

Further details about the proposed issue by Associated Electrical Industries confirm that new shares are to be offered at 50s. to shareholders, in the proportion of one for every five held. Treasury consent has been given and the proposal will be put before the shareholders very shortly. More than £2½ millions new money is involved. With the existing shares at 59s. 6d. rights to the new will be worth about 1s. 6d. per share.

Telegraph Construction Results

The Telegraph Construction & Maintenance company's full report, which followed the dividend announcement of 10 per cent for the year, showed a decline in trading profits. This unsettled the market in the shares to some extent. Provision for taxation, however, called for a mere fraction of the previous year's figure, and the company is left with a slightly increased net surplus for the dividend and appropriations. The 10 per cent payments made since 1936 have generally represented a conservative dividend policy, which is reflected in the strength of the balance sheet. The price has gone back to 56s. 6d.—having declined recently from over 60s.,—and offer a return of 3½ per cent.

Preference Shares and Compensation

A Bill brought before the South Australian Government for the acquisition of the Adelaide Electric Supply Co., has aroused attention because it brings out the practical financial difficulties in the way of affording fair compensation to all classes of shareholders on the basis of the market prices ruling last August. The company is up in arms on behalf of the ordinary shareholders. By rights, they are entitled on a liquidation to all the assets remaining after repayment of the preference capital at par; but under the suggested scheme they would make a present of well over a million pounds to holders of the senior issues.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

BRITISH Thermostat Co., Ltd., and W. F. F. Martin Hurst.—" Control means " for engine cooling systems." 757. January 14th, 1944. (576140.)

British Thomson-Houston Co., Ltd.—" Electrical contact elements or brushes." 8394/42. June 21st, 1941. (576155.) " Electric motor control systems." 17868/42. December 24th, 1941. (576162.) " Reaction products of aldehydes and bis- (diamino triazinyl) cyano-alkylene disulphides." 3786/43. March 17th, 1942. (576163.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Turbo supercharger systems for internal-combustion engines." 1859. January 23rd, 1945. (576241.)

British Thomson-Houston Co., Ltd., A. L. Whiteley and L. C. Ludbrook.—" Electric control systems." Cognate applications 14847/40 and 9603/41. October 3rd, 1940. (576117.)

E. M. Chance.—" Electric telemotor control apparatus particularly applicable to automatic steering." 4725/40. March 13th, 1939. (576116.)

Cinema-Television, Ltd., and T. M. C. Lance.—" Cathode-ray tubes." 7822. April 26th, 1944. (576204.)

Cinema-Television, Ltd., and S. S. West.—" Deflecting circuits for cathode-ray tubes or the like." 16267. November 17th, 1942. (576158.)

F. S. Cotton & W. Helmore.—" Navigation lights for night-flying aircraft." 16817. November 22nd, 1940. (576118.)

Erskine, Heap & Co., Ltd., and W. Allcock.—" Electric switchgear and contacts therefor." 8799. May 9th, 1944. (576114.)

General Electric Co., Ltd., and E. C. Cherry.—" Automatic volume control devices in radio pulse receivers." 18050. December 18th, 1942. (576103.)

General Electric Co., Ltd., and R. J. Clayton.—" Coaxial cables." 5086. April 19th, 1941. (576147.)

General Electric Co., Ltd., and E. H. Croft.—" Control of electric motors used for rheostatic braking." 5974. May 4th, 1942. (576123.)

General Electric Co., Ltd., and E. M. Hickin.—" Magnets adapted for use with magnetrons." 13304. September 21st, 1942. (576096.)

General Electric Co., Ltd., and G. T. K. Lark.—" Electric circuit arrangements for discharge devices and other purposes involving transformers having leakage paths." 14027. October 31st, 1941. (576084.)

General Electric Co., Ltd., and E. M. Leyton.—" Methods and apparatus for subjecting materials to high-frequency electrical oscillations." 13975. October 5th, 1942. (576097.)

General Electric Co., Ltd., N. R. Bligh, D. M. Heller, L. C. Stenning and A. A. Chubb.—" Means for tuning an electrical oscillator." 17775. December 14th, 1942. (576161.)

W. Helmore.—" Mounting of searchlights on aircraft." 11173. September 1st, 1941. (576214.)

W. T. Henley's Telegraph Works Co., Ltd., and W. F. O. Pollett.—" Polyvinyl resin compound suitable for covering electric wires and cables." Cognate applications 18555/42, 14686/43. December 30th, 1942. (576110.)

W. T. Henley's Telegraph Works Co., Ltd., H. A. Tunstall and W. F. O. Pollett.—" Electric insulated wires and cables." Cognate applications 18556/42, 14685/43. December 30th, 1942. (576111.)

J. Lucas, Ltd., and H. H. Foxall.—" Instrument panels for mechanically propelled vehicles." 1645. January 28th, 1944. (576168.)

A. Mandl and Metropolitan-Vickers Electrical Co., Ltd.—" Dynamo-electric machines." 19042. November 15th, 1943. (576226.)

Marconi's Wireless Telegraph Co., Ltd., and C. S. Franklin.—" Radio aerials." 17297. December 4th, 1942. (Addition to 573896.) (576159.)

B. J. Mayo.—" Electron-discharge devices employing hollow resonators." 10107. August 8th, 1941. (576121.) " Electron-discharge devices employing hollow resonators." 10559/42. August 8th, 1941. (Divided out of 576121.) (576126.) " Circuit arrangements embodying electron-discharge employing hollow resonators." 10699/42. August 8th, 1941. (Divided out of 576121.) (576127.)

M–O Valve Co., Ltd., and L. R. E. Windsor.—" Electric discharge devices having sealed vitreous envelopes." 447. January 12th, 1942. (576085.)

M–O Valve Co., Ltd., D. H. Donaldson and R. O. Jenkins.—" Manufacture of thermionic valves and the like." 940. January 22nd, 1942. (576151.)

M–O Valve Co., Ltd., E. G. Rowe and J. A. Smyth.—" Thermionic discharge devices." 13409. September 23rd, 1942. (576128.)

Siemens-Schuckert (Great Britain), Ltd., and R. W. Kirkup.—" Supporting stands for power-operated drilling machines for coal, stone, and the like." 755. January 14th, 1944. (576139.)

Soc. Francaise Radio-Electrique.—" Symmetrical neutrodyned mounting of amplifiers operating with short waves of great power." 3752/42. February 27th, 1941. (576152.)

Sperry Gyroscope Co., Inc.—" Mountings for unidirectional electrically conducting crystals." 6528/42. May 19th, 1941. (576154.)

Standard Telephones (& Cables, Ltd., and I. V. Feldhusen.—" Manufacture of calibrated scales for electric oscillators and like apparatus." 6901. April 14th, 1944. (576192.)

J. Stone & Co., Ltd., and A. H. Chilton.—" Electric torpedoes." 6073. May 6th, 1942. (576088.)

Western Electric Co., Inc.—" Attenuator for guided electro-magnetic waves." 8053/44. May 7th, 1943. (576145.)

G. W. Wiard.—" Electric fuse construction." 18628. November 9th, 1943. (576225.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Abertillery.—April 19th. Electricity Department. Electrical stores and materials for twelve months. (April 5th.)

Ashton-under Lyne.—May 6th. Electricity and Public Lighting Committee. One petrol-driven, or alternatively, one electrically-driven chassis, equipped with 25-ft collapsible tower suitable for maintenance of street lighting. (See this issue.)

Australia. — June 13th. Sydney County Council. Steam, feedwater and other piping, valves, etc., for Pyrmont "B" generating station.

Birmingham.—May 9th. Electric Supply Committee. Cables, switchgear, conduits, protective covers and jointing compounds for twelve months. (See this issue.)

Burnley.—April 15th. Electricity Department. Cables and transformers. (April 5th.)

Farnworth.—April 23rd. Electricity Department. Cables, overground and underground boxes, transformer, switchgear, distribution board and meters. (See this issue.)

Hastings.—April 15th. Electricity Department. One 11-kV three-phase outdoor type switch kiosk. (March 29th.)

Kettering.—April 29th. Electricity Department. One 400-kVA, one 350-kVA, one 6,000-kVA and two 500-kVA transformers. (March 29th.)

Leeds.—May 4th. Transport Committee. Automatic mercury arc rectifier equipment, with switchgear. (March 29th.)

New Mills.—April 19th. Electricity Department. L.v. cables and feeder pillars. (March 29th.)

North of Scotland.—April 22nd. Hydro-Electric Board. Submarine power cables in Bute and South Cowal area. (March 29th.)

April 29th. H.v. and l.v. overhead lines in Island of Islay, Argyllshire. (April 5th.)

May 2nd. H.v. and l.v. overhead lines and underground cables in Millport, Island of Great Cumbrae, Buteshire. (April 5th.)

Plymouth.—May 4th. Electricity Supply Dept. 33,000-V cables, joint assembly units and auxiliary pilot cables. (See this issue.)

Pudsey.—April 30th. Electricity Department. Electric cookers, washboilers, washing machines and fires for twelve months. (See this issue.)

Rotherham.—April 20th. Rural District Council. Electrical wiring of the Council's houses. (March 29th.)

Sheffield.—June 3rd. Electricity Department. Steam generators together with all associated equipment for the Neepsend generating station. (April 5th.)

May 13th. Two oil-immersed, copper shielded reactors. (See this issue.)

Orders Placed

Blackpool.—Housing Committee. Accepted. Electrical installations at 32 houses, St. Walburga's estate (£466).—R. Ball.

Bolton. — Lighting Committee. Accepted. Sodium lighting fittings for town centre.—Revo Electric Co.

Cardiff.—Electricity Committee. Accepted. Switchgear for Ely substation (£5,424).—South Wales Switchgear. Switchgear for biscuit factory, Pengan (£1,122).—Cooke & Ferguson. Metering equipment (£131).—Aron Electricity Meter.

Eastbourne.—Housing Committee. Accepted. Electrical installations in houses on the Roselands estate: One block of three houses (£200) and two pairs of semi-detached houses (£130 per pair).—W. P. Surrage. One pair of semi-detached houses (£124 per pair).—Miller & Selmes. Other semi-detached houses (£160 per pair).—Page & Miles.

Glasgow.—Electricity Committee. Accepted. Three 6,000-kVA transformers (£14,361).—Bruce Peebles & Co.

Transport Committee. Accepted. Cables.—Scottish Cables (£5,079); Craigpark Electric Cable Co. (£2,598). Switchboard for head office.—English Electric Co.

Ilford.—Electricity Committee. Accepted. Batteries for two Metrovick electric vehicles (£262).—Chloride Electrical Storage Co.

Manchester.—Transport Committee. Accepted. Overhead materials for trolley-bus operation.—B.I. Callender's Cables; A. Wiseman; Forest City Electric Co.; Turners Asbestos Cement Co.; Richard Johnson & Nephew.

Electricity Committee. Accepted. Twelve months' contracts. Electric wash-boilers.—Amplec; Burco. House-service units.—B.I. Callender's Cables; Parmiter, Hope & Sugden. Domestic electric cookers.—Revo Electric Co.; Moffats; English Electric Co.; General Electric Co.; Elexcel.

St. Marylebone.—Electricity Committee. Accepted. Maintenance of metering equipment at power station for twelve months (£289).—Landis & Gyr.

Salford.—Light Heat & Power Committee. Accepted. Eight 6·6-kV circuit-breakers (£2,125).—Metropolitan-Vickers.

Sheffield.—Electricity Committee. Accepted. 14-panel switchboard (£6,523).—Switchgear & Cowans. Eight 400-V auxiliary and three 3,000-V transformers for Neepsend power station (£4,275).—Electric Construction Co.

Water Committee. Accepted. Switchgear for pumping station (£325).—Brookhirst.

Sleaford.—Electricity Committee. Recommended. Cable extensions (£2,071).—B.I. Callender's Cables.

Warrington.—Catering Committee. Accepted. Electric roasting oven (£125).—G.E.C. Electric tea urn (£56).—Santon.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Anglesey.—Secondary School, Holyhead, Education Committee; J. Elfet Rees, county architect, County Offices, Llangefni.

Ayrshire.—New byre and dairy, Monkton Hill farm (£27,000); architect, Scottish Co-operative Wholesale Society, Glasgow.

Baildon.—Permanent houses (56), Knoll estate; P. A. Watford, surveyor, Town Hall.

Beccles.—Houses (59), Ridgebourne Hill; borough surveyor.

Bishop Auckland.—Houses (48), Copeland Lane West; M. C. Robson, architect, Station Chambers.

Blofield and Flegg.—Houses (116), for U.D.C.; C. E. George, architect, Council Offices, Acle, Norwich.

Bolton.—Houses (60), Breightmet Hall estate (£81,790); Wm. Townson & Sons, Ltd.

Permanent houses (180), Lever Edge estate; borough engineer.

Completion of Technical College ; Lanchester & Lodge, architects, and Hoare, Lea & Co., consulting engineers.

Bournemouth.—Cinema, shops and flats, Tuckton Road and Stour Road; W. E. Trent, architect.

Chester.—Houses (294), Blacon; city engineer.

Extensions, Reliance Works, Liverpool Road; Williams & Williams, Ltd.

Dumbartonshire. — Houses (294); county architect, 18, Park Circus, Glasgow, C.3.

Dumfries.—Houses (158), at Lincluden; burgh surveyor.

Dundee.—Houses (205); city quantity surveyor, 21, City Square.

Eastbourne.—Fire station, Bourne Street; borough engineer.

Edinburgh.—Extension to the crematorium, comprising an electric incinerator and mortuary; Edinburgh Crematorium, Ltd.

Houses (617), in Sighthill area; city architect.

Essex.—Primary school, Grange Hill, Chigwell (£77,700) and school, Friday Hill estate, Chingford (£81,000); county architect, Chelmsford.

Friern Barnet.—Flats (60), Alexandra Road; U.D.C. surveyor.

Glasgow.—Houses (116), Pollok estate (£134,247); Stewart & Monro, Ltd.

Clothing factory, Alexandra Parade; Collins Mantles, Ltd.

Grantham.—Umbrella factory; Kendall & Sons, Ltd., Leicester.

Hull.—Rebuilding 32 houses, East Hull estate (£31,231); F. Bilton, Ltd.

Langley Moor (Co. Durham).—Clothing factory, Hirst & Thackway; F. Hedley, architect.

Lewisham.—Workshops, Wearside Road depot (£28,500); borough engineer, Council Offices, Town Hall, Catford, S.E.6.

Lowestoft.—Houses (82), Yarmouth Road; borough engineer, Town Hall.

Manchester.—Factory for instrument making and drawing office materials, Longley Lane, Wythenshawe; A. G. Thornton, Ltd.

Factory for litho printing and account book manufacture, Bradnor Road, Wythenshawe; Norbury, Lockwood & Co., Ltd.

Newcastle-on-Tyne.—Development scheme, Royal Victoria Infirmary (£200,000); Board of Governors.

Norwich.—Primary school, North Earlham; borough engineer.

Penrith.—Electrical installation, Fairhill Isolation Hospital; J. W. Butler, Town Hall.

Rochdale.—Extensions, Brookside Mills; S. Heap & Sons, Ltd.

Improvements, Mars Mill (£120,000); Lancashire Cotton Corporation, architects' department, Hopwood Hall, near Middleton, Lancs.

Rotherham.—Electric wiring in 361 houses; J. E. Nicholson, 4, South Terrace, Moorgate.

Factory, Eastwood Trading estate; Jay-Zed Gowns, Ltd.

St. Marylebone.—Block of flats, Kingsmill Terrace; T. P. Bennett & Son.

Salford.—Works canteen, alterations repair workshop, 136, Bolton Road, Pendleton; F. Taylor & Sons (Manchester), Ltd.

South Shields.—Factory additions, Rutland Street, for Wrights Biscuits, Ltd.; W. & T. R. Milburn, architects, 17, Fawcett Street, Sunderland.

Factories, Bede Trading estate; Cackett, Burns Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Electric lighting installations in 230 houses; borough engineer, Town Hall.

South Shields.—Primary school, Horsley; J. Wilkes, architect, South View, Cauldwell.

Southwold.—Permanent houses (48), Reydon and Southwold; H. W. Binns, architect, 19, Southampton Place, London, W.C.1.

Stockport.—Works canteen, offices and lavatories, Vernon Mills, Mersey Street, Portwood; P. Leach Productions, Ltd.

Stornoway.—Reconstruction scheme for Pier and Harbour Commissioners, including new fish market, offices, etc.; clerk to the Commissioners.

Sunderland.—Furniture factory, for Ditchburn's, Ltd.; J. W. White, High Barnes.

Tenterden (Kent).—Permanent houses (48), Station Road; W. Lynn Thompson, architect, The Ingles, Hawkhurst, Kent.

Tettenhall,—Permanent houses (90), Long Lake; J. W. Mason, surveyor, Council Offices.

Torquay.—Reconstruction, Babbacombe Cliff Railway (£22,000); Dr. Oscar Faber.

Twickenham.—Crematorium; Denman & Son, consulting architects, 27, Queens Road, Brighton.

Wakefield.—Cinema, Peacock Avenue; Savoy Picture House (Huddersfield), Ltd

Wallasey.—Secondary school, Gorsey Lane; borough engineer.

Warwickshire.—Extensions and improvements, Alcester Hospital (£16,000); county architect, Warwick.

Watford.—Factory, Balmoral Road; Stanley Machinery, Ltd.